THE EFFECT OF THE CANTERBURY EARTHQUAKES ON ALCOHOL CONSUMPTION AND MOTIVATIONS FOR DRINKING AMONG PSYCHOLOGICALLY RESILIENT INDIVIDUALS

A thesis submitted in partial fulfilment of the requirements for the Degree of

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Last but not least, to the residents of Christchurch who participated selflessly in this study, I thank you for the privilege of sharing your experiences and insights with me.

PREFACE

This thesis was completed in the context of a larger community research project investigating individual responses to the Canterbury earthquake sequence, to which I contributed by way of data collection over the past 13 months. Researchers involved in the larger study are Dr Caroline Bell, Dr Virginia McIntosh, Dr Janet Carter, Dr Martin Dorahy, Dr Jenny Jordan and Professor Richard Porter.

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ABSTRACT

Individual responses to natural disasters are highly variable. The psychological and behavioural response trajectories of those who manage to cope well with adverse life events are in need of further investigation. Increased alcohol use is often observed in communities exposed to mass traumas, particularly among those exposed to severe levels of trauma, with males drinking more than females. The current study examined patterns of alcohol use and motivations for drinking among a sample of psychologically resilient individuals with varying levels of exposure to the Canterbury earthquakes (N = 91) using structured and semi-structured interviews and self-report measures**.** As hypothesised, there was a significant increase in alcohol consumption since the earthquakes began, and males reported significantly higher levels of pre-earthquake and current alcohol consumption than females. Contrary to expectations, there was no association between traumatic exposure severity and alcohol consumption. While participants reported anxiety-based coping motives for drinking at levels comparable to those reported by other studies, depression-based coping motives were significantly lower, providing partial support for the hypothesis that participants would report coping motives for drinking at levels comparable to those found by other researchers. No gender differences in drinking motives were found. As expected, current alcohol consumption was positively correlated with anxiety and depression-based coping motives for drinking. Psychological resilience was not significantly associated with alcohol use, however resilience was negatively associated with depression-based coping motives for drinking. These findings have inter-generational and international implications for post-traumatic intervention.

CHAPTER ONE

1. INTRODUCTION

"The cliffs that we were cycling beside and
walking beside rumbled down, […] these rocks
just came to within a metre of us, it was
absolutely stunning [...] everyone was silent and
all you could hear was the earth, it was
absolutely spectacular. "

– Participant C106, 2013

1.1. Overview and Rationale

On September 4th, 2010, a magnitude 7.1 earthquake struck Canterbury at 4.35 am. Since this time, thousands of earthquakes and aftershocks have become an ongoing reality for the residents of this region, including a major 6.3 magnitude earthquake on February 22nd, 2011. The series of seismic events are among the most destructive natural disasters in New Zealand's history. They have had devastating consequences for the region, including 185 fatalities, physical injury, and widespread property and infrastructure damage. The Canterbury earthquake sequence has provided a unique opportunity to investigate individual responses to mass trauma, including substance use behaviours and how these relate to psychological adjustment. While many who experienced the Canterbury earthquakes have suffered acute and chronic posttraumatic stress responses, this thesis describes an interesting subset of the community who have managed to adapt and even thrive in the face of such adversity.

Webb (2004, p. 4) defines a "*mass trauma*" as a "frightening, potentially life-threatening event that is experienced by a large number of people simultaneously". Mass trauma events such as war, acts of terrorism, technology-related and transportation disasters, community violence and natural disasters affect millions of people every year (Başoğlu & Şalcioğlu, 2011). Although mass traumas are not necessarily experienced as traumatic by every person who witnesses the events, this is a commonly accepted term in the literature for large-scale, potentially traumatic events. Therefore, it will be a term used throughout this thesis for events consistent with Webb's definition.

Alcohol is the most commonly used substance in New Zealand (Ministry of Health, 2009) and increases in its use are often reported following exposure to potentially traumatic events (Boscarino, Adams & Galea, 2006; Cerda, Tracy & Galea, 2011; Grieger, Fullerton & Ursano, 2003; Pfefferbaum & Doughty, 2001; Vetter, Rossegger, Rossler, Bisson & Endrass, 2008; Vlahov et al., 2004). Possible reasons behind this increase will be elucidated further, particularly with regard to coping-based motivations for alcohol use. Drinking to cope with negative affective states is often observed in trauma-exposed populations (Bleich, Gelkopf & Solomon, 2003; Dixon, Leen-Feldner, Ham, Feldner & Lewis, 2009; Medina et al., 2011). Maladaptive and psychopathological outcomes were traditionally associated with coping-based motives for drinking, however recent studies suggest that moderate alcohol use can also be associated with positive psychological outcomes post-trauma (Grant, Stewart & Mohr, 2009; Kuntsche, Knibbe, Gmel & Engels, 2005; Maes, Delmeire, Mylle & Altamura, 2001).

Research has highlighted three trajectories of psychological adjustment to potentially traumatic events: psychological resilience, recovery, and severe disruptions in functioning (Bonanno, 2004; Bonanno, 2012; Bonanno & Mancini, 2012; Connor & Davidson, 2003; Norris, Tracy & Galea, 2009). Although studies consistently find that a subset of the

population develops severe and chronic mental health problems in response to mass trauma events, many individuals are able to cope with such experiences without developing psychopathology (Neria, Nandi & Galea, 2008; Olff, Langeland & Gersons, 2005; Priebe et al., 2011). Psychological resilience, the ability to maintain psychological stability and adapt positively to adverse events, is a relatively under-researched area in the trauma literature despite recent studies suggesting that this may be a relatively common response to potentially traumatic events (Bonanno, 2004; Campbell-Sills, Cohan & Stein, 2006).

This chapter will present an overview of research on alcohol use in New Zealand, motivations underpinning alcohol consumption, exposure to potentially traumatic events focussing on natural disasters when possible, and factors relating to psychological vulnerability and resilience. These concepts, the links between them, and the limitations of research in these areas provide the rationale for the current study.

1.2. Patterns of Alcohol Use Among Females and Males

Data from the 2007/08 New Zealand Alcohol and Drug Use Survey show that alcohol use is common in New Zealand, with 85% of the population aged 16-64 reporting having consumed at least one alcoholic beverage within the last 12 months (Ministry of Health, 2009). Men were statistically more likely than women to report drinking alcohol in the past year (88.4% versus 82.7%, respectively). Among those individuals who consumed any alcohol within the past year, 61% consumed alcohol at least once per week, with men more likely to show this pattern of frequent alcohol use (65.9% of males and 52.3% of females drank alcohol at least weekly). Of those who used alcohol in the past 12 months, 6.8% did so daily (6.3% of males and 4.3% of females), and this prevalence increased with age (those aged 55-64 were most likely to report daily alcohol use). In addition, 61.6% of past-year drinkers had engaged in binge drinking behaviour at least once in the last 12 months (defined

as more than six standard drinks on one occasion for males; four standard drinks for females), and 12.6% of respondents had consumed a large amount of alcohol at least once per week. Males were more likely to report weekly binge drinking (16.9%) than females (11.4%), and in particular young males (33.8% of males versus 18.8% of females aged 18-24).

Gender differences in alcohol consumption are a consistent trend in existing research. Women tend to report lower levels of alcohol consumption, in both frequency and amount, than men (Kerr-Correa, Igami, Hiroce & Tucci, 2007; Nolen-Hoeksema, 2004; Wilsnack, Vogeltanz, Wilsnack & Harris, 2000). Females are also at lower risk of developing alcohol use disorders than males (Brady & Randall, 1999). Two alcohol use disorders - alcohol abuse and alcohol dependence - are described in the Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV-TR; American Psychiatric Association, 2000). These disorders are defined as "a maladaptive pattern of drinking, leading to clinically significant impairment or distress", and additional criteria differentiate between the two. While prevalence rates of alcohol use disorders vary, men tend to be between two and five times more likely than women to be diagnosed with alcohol abuse and/or dependence (Brady & Randall, 1999; Brienza & Stein, 2002). Men experience more alcohol-related adverse outcomes such as legal, occupational, social and physical health problems, however this is likely to be directly related to higher levels of alcohol misuse rather than gender alone (Kerr-Correa, Igami, Hiroce & Tucci, 2007; Wilsnack, Vogeltanz, Wilsnack & Harris, 2000).

The reasons behind higher levels of alcohol use among men are likely to be multi-faceted, and include factors such as social roles and biological variables. Women experience social stigmatisation and relationship disruption at lower levels of alcohol consumption than men (Kerr-Correa, Igami, Hiroce & Tucci, 2007; Wilsnack, Vogeltanz, Wilsnack & Harris, 2000). In addition, the adverse effects of alcohol on fetal development are well established (World Health Organization, 1998). Drinking alcohol during pregnancy is not recommended

by medical professionals, and often results in disapproval from family members and friends (Kerr-Correa, Igami, Hiroce & Tucci, 2007). Conversely, heavy drinking may be used as a socially acceptable medium for seeking peer support and facilitating social bonding among males, and to demonstrate masculinity in social situations (Brienza & Stein, 2002; Kerr-Correa, Igami, Hiroce & Tucci, 2007; Wilsnack, Vogeltanz, Wilsnack & Harris, 2000).

Further, the physiological effects of alcohol are more pronounced among females. Women have less of the alcohol metabolising enzyme alcohol-dehydrogenase and lower levels of body water. This means that women metabolise alcohol at a slower rate and evidence higher blood alcohol levels when compared with men of the same size who consume the same amount of alcohol (Brienza & Stein, 2002; Kerr-Correa, Igami, Hiroce & Tucci, 2007; Wilsnack, Vogeltanz, Wilsnack & Harris, 2000). Women also show increased vulnerabilities to negative health outcomes associated with alcohol use, such as liver cirrhosis, neurological impairment and breast cancer (Brady & Randall, 1999; Brienza & Stein, 2002; Kerr-Correa, Igami, Hiroce & Tucci, 2007). In summary, gender roles and social responsibilities discourage women from consuming large amounts of alcohol, they require less alcohol than men to feel the same intoxicating effects, and are more susceptible to adverse health outcomes associated with alcohol use. Taken together, these factors may help explain why women tend to drink less alcohol than men.

1.3. The Health Effects of Alcohol Use

Excessive, chronic drinking, as seen in those with alcohol use disorders, affects virtually all systems of the human body (World Health Organization, 2007). However, alcohol use does not need to be disordered in order to be harmful; even moderate levels of alcohol intake have been linked to suboptimal short- and long-term outcomes, such as increased mortality and substantial societal costs (Konnopka & Konig, 2009; World Health

Organization, 2007). Moderate consumption has been defined by the United States Department of Health and Human Services as a maximum of 1 drink per day for females and 2 drinks for males, and 7 drinks per week for females and 14 drinks per week for males (Gunzerath, Faden, Zakhari & Warren, 2004).

Consumption of alcohol has been associated with numerous adverse behavioural, social, physical and psychological outcomes. The World Health Organization (WHO; 2007) reports that alcohol is a causal factor in 3.7% of deaths worldwide, and represents 4.4% of the global burden of disease. Acute alcohol-related harm is most often due to the direct effects of intoxication on behaviour, resulting in increased risk-taking. Alcohol-induced risky behaviours include drink driving (19.8% of past-year drinkers reported driving while under the influence of alcohol in the New Zealand Alcohol and Drug Use Survey), unprotected sexual activity and criminal, violent or aggressive behaviour, through which unintentional injury often results (Gunzerath, Faden, Zakhari & Warren, 2004; WHO, 2007).

Alcohol-related consequences can also be long-term, including chronic health problems and interpersonal and professional difficulties (Room, Babor & Rehm, 2005; WHO, 2004; WHO, 2007). In the New Zealand Alcohol and Drug Use Survey, the most commonly reported harmful effects experienced due to alcohol use were interpersonal/social problems (6.9%), failure to fulfil occupational responsibilities (5.6%), home life issues (5.4%), financial problems (5.4%) and physical injuries (4.7%). Alcohol consumption has been identified by the World Health Organization (2004; 2007) as a risk factor for over 60 disorders, including cardiovascular diseases, various cancers, cirrhosis of the liver, acute alcohol poisoning, hypertension, stroke, birth defects and immunodeficiencies. Lethal doses of alcohol cause death via a toxic reaction in the body. Psychiatric symptoms such as hallucinations and mood and sleep difficulties are often seen among chronic alcohol abusers,

and binge drinking has been associated with an increased risk of mood and anxiety disorders (Dawson, Grant, Stinson & Chou, 2005).

In contrast, some studies have reported physical and psychological benefits to moderate alcohol consumption among both male and female samples. A small number of studies has associated regular light drinking with the prevention of heart disease among some individuals, however this finding remains controversial, especially as alcohol is a substance known to have the capacity to create dependence over time, and moderate drinking is a risk factor for later alcohol abuse and dependence (Gunzerath, Faden, Zakhari & Warren, 2004; WHO, 2004; WHO, 2007). Baum-Baicker (1985) found in a review of existing research, that moderate drinking is effective in reducing stress and negative affect, and can increase levels of pleasant affective experiences. More recently, researchers have also suggested that moderate drinking is associated with enhancement of mood, elation, social functioning, psychological well-being, increased energy and stress reduction (Conrod, Peterson & Pihl, 2001; Peele & Brodsky, 2000; Wilkie & Stewart, 2005). In addition, Maes, Delmeire, Mylle & Altamura (2001) report that alcohol consumption shortly before or during a traumatic event may attenuate distress and anxiety associated with such an event, resulting in a reduced risk of developing symptoms of posttraumatic stress. Thus, there may be potential benefits to moderate alcohol consumption in response to ongoing natural disasters, however this has not been evaluated.

1.4. Psychological Adjustment Following Mass Trauma

Epidemiological studies show that the experience of potentially traumatic events is highly prevalent among the general population, and psychological responses to natural disasters are diverse and often long lasting (Briere & Scott, 2006; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Lai, Chang, Connor, Lee & Davidson, 2004; Priebe et al., 2011).

The psychological adjustment trajectories of severe disruptions in functioning, resilience, and recovery, and factors related to positive psychological adjustment after potentially traumatic events, will be outlined further in this section.

Severe disruptions in functioning result from maladaptive psychological responses to potentially traumatic events, including psychopathology. This may represent chronic dysfunction since the event or may have a delayed onset. Acute and chronic psychological and physiological stress responses are common among populations exposed to potentially traumatic events. The links between exposure to potentially traumatic events and psychological symptoms have been studied extensively among clinical and non-clinical populations, both among natural disaster survivors and among individuals who have experienced other types of trauma. Some trauma survivors develop severe mental health problems such as acute stress disorder, posttraumatic stress disorder, depression, substance use disorders and anxiety disorders which can persist long after the actual event (Bryant et al., 2006; Carlson & Dalenberg, 2000; Dorahy & Kannis-Dymand, 2012; Neria, Nandi & Galea, 2008; Priebe et al., 2009; Şalcioğlu & Başoğlu, 2010; Wang et al., 2000; Xu & Feng, 2012; Zhang, Shi, Wang & Liu, 2011), and an even greater number of individuals may develop subthreshold levels or symptoms of these conditions (Cukor et al., 2011; North, Smith, McCool & Lightcap, 1989). For example. Norris, Perilla, Riad, Kaniasty and Lavizzo (1999) investigated the long-term effects of exposure to a hurricane. The authors reported that although symptom profiles changed over time, prevalence rates of posttraumatic stress disorder and depression did not decrease between 6 and 30 months post-disaster, underscoring the chronic nature of severe reactions to trauma.

Conversely, numerous studies have reported declines in psychological distress and symptom levels over time consistent with the recovery pathway (Altindag, Ozen & Sir, 2005; Bleich, Gelkopf & Solomon, 2003; Bleich, Gelkopf, Melamed & Solomon, 2006; Carr et al,

1997; Cook & Bickman, 1990; Neria, Nandi & Galea, 2008; North, Smith, McCool & Lightcap, 1989; Van Griensven et al., 2006). Recovery refers to a return to previous levels of functioning after a period of moderate or severe disruption. For example, mental health outcomes were assessed in a sample of adults exposed to a tsunami in Thailand by Van Griensven et al. (2006). The authors reported significant reductions in symptoms of posttraumatic stress disorder, anxiety and depression between 2 and 9 months post-disaster.

A range of internal (subjective) and external (objective) factors have been found to relate to psychological adjustment after a potentially traumatic event. Internal factors associated with psychological distress typically pertain to how individuals perceive the event; intense fear reactions during the experience, perceived threat to self and/or others, low perceived controllability, emotion-focussed coping styles and low coping self-efficacy predict maladjustment post-trauma (Başoğlu, Şalcioğlu & Livanou, 2002; Benight & Harper, 2002; Freedy, Saladin, Kilpatrick, Resnick & Saunders, 1994; Hooberman, Rosenfeld, Rasmussen & Keller, 2010).

External factors relating both to the individual and to the event itself have also been associated with adjustment following mass trauma. Demographic and psychological characteristics, such as gender, age, past experience of psychiatric illness, prior trauma exposure and psychosocial disadvantage have all been found to predict psychological distress post-trauma (Başoğlu, Şalcioğlu & Livanou, 2002; Bleich, Gelkopf & Solomon, 2003; Freedy, Saladin, Kilpatrick, Resnick & Saunders, 1994; Lai, Chang, Connor, Lee & Davidson, 2004; Sharan, Chaudhary, Kavethekar & Saxena, 1996).

Characteristics of the potentially traumatic event itself are also important when considering posttraumatic reactions. Psychological adjustment varies as a function of trauma-specific factors, such as whether the event was man-made versus a natural disaster and whether it was a single occurrence or an ongoing experience (Briere & Scott, 2006; Neria,

Nandi & Galea, 2008; Norris, 1992). For example, in their review of posttraumatic stress disorder following mass traumas, Neria, Nandi and Galea (2008) reported significant variability when comparing prevalence rates of psychiatric disorders subsequent to differing types of natural disaster, such as earthquake, flood, wildfire and tsunami. The same authors found that higher levels of psychopathology tend to be reported among those exposed to man-made (as opposed to natural) disasters.

High levels of exposure to traumatic events, including experiences such as being trapped during a natural disaster, injury of self or significant others, bereavement, seeing deceased or injured people, engaging in rescue work, property destruction, dislocation and unemployment have also been associated with increased risk of psychological morbidity (Altindag, Ozen & Sir, 2005; Başoğlu, Şalcioğlu & Livanou, 2002; Lai, Chang, Connor, Lee & Davidson, 2004; Sharan, Chaudhar, Kavethekar & Saxena, 1996). A "*dose-response*" effect of trauma has been found. This effect refers to the relationship between the dose of the aforementioned risk factors experienced by the individual, or the level of traumatic exposure, and the ensuing psychological response. Higher levels of exposure to traumatic events are reported to predict higher levels of psychological symptoms and distress (Freedy, Saladin, Kilpatrick, Resnick & Saunders, 1994; Neria, Nandi & Galea, 2008; Lai, Chang, Connor, Lee & Davidson, 2004), although this relationship is not always found (Bleich, Gelkopf, Melamed & Solomon, 2006). The dose-response effect is also relevant to alcohol use post-trauma; this will be outlined further in subsequent sections (Boscarino, Adams & Galea, 2006; Cerda, Tracy & Galea, 2011; Nordlokken, Pape, Wentzel-Larsen & Heir, 2013; Vetter, Rossegger, Rossler, Bisson & Endrass, 2008).

Many individuals, however, manage to cope with adverse life events without significant disruptions in psychological, emotional or behavioural functioning, and there is also evidence that there are positive outcomes from hardship and adversity, such as

posttraumatic growth and increases in pro-social behaviour (North, Smith, McCool & Lightcap, 1989; Rao et al., 2011; Yu et al., 2010). While prevalences vary, most individuals experience traumatic events or significant adversity at some point in their life, and the majority do not develop psychopathology as a result (Briere & Scott, 2006; Campbell-Sills, Cohan & Stein, 2006; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Norris, 1992; Olff, Langeland & Gersons, 2005). In recent years, some researchers have attempted to investigate characteristics that relate to psychological well-being after mass trauma. Psychological resilience is an important concept highlighted by this research and will be discussed in more detail.

1.5. Psychological Resilience

A number of vulnerability factors for psychological distress following adverse life events have been outlined. Traditionally, the research on trauma tended to emphasise risk factors for psychopathology given the importance of doing so in identifying at-risk populations and treatment targets. More recently, "*positive psychology*" has identified individual strengths in order to promote psychological wellbeing and quality of life in a more holistic sense (Seligman & Csikszentmihalyi, 2000). In line with this, psychological resilience has been identified as a protective factor for positive mental health (Bensimon, 2012; Campbell-Sills, Cohan & Stein, 2006; Connor, 2006; Truffino, 2010). Given that only a minority of individuals develop mental health problems after mass trauma, resilient responses to adversity may be more common than once believed (Bensimon, 2012; Bonanno, 2004; Campbell-Sills, Cohan & Stein, 2006).

Psychological resilience has its roots in developmental psychology, in which researchers aimed to understand why some children appeared to cope with early life adversity such as poverty, sexual abuse and parental violence, while others evidenced poor

psychological and behavioural outcomes (Garmezy, 1991; Rutter, 1987). Subsequently, this concept was applied to adults without a clear operationalisation of what resilience represents in this population, resulting in a lack of conceptual coherence (Bonanno, 2012). Studies have provided manifold definitions for resilience. For example, resilience has been described as a personality trait, as a combination of personal qualities and abilities, as a learned or dynamic process of overcoming adversity, as an outcome, as protective factors for poor outcomes, as repertoires of behaviours, as a defence mechanism, as the capacity to cope or quickly recover from adversity and as psychological stability in response to stress (Bonanno, 2004; Connor & Davidson, 2003; Davydov, Stewart, Ritchie & Chaudieu, 2010; Fletcher & Sarkar, 2013; Leipod & Greve, 2009). This conceptual heterogeneity has made it difficult to measure resilience reliably, and to interpret and compare research outcomes (Davydov, Stewart, Ritchie & Chaudieu, 2010; Fletcher & Sarkar, 2013).

In their comprehensive reviews of research on resilience, Fletcher and Sarkar (2013) and Luthar, Cicchetti and Becker (2000) revealed that in the field of social sciences, studies tend to converge on two preconditions for the demonstration of psychological resilience; experience of adversity and associated positive adaptation. Unfortunately, these terms also suffer from conceptual inconsistencies across studies. Adversity has been conceptualised in a variety of ways. While some studies use the term to describe common difficulties experienced in daily life such as financial stress or social discrimination, others understand adversity to refer to more rare, severe experiences such as childhood abuse, war, violent attacks and natural disasters (Davis, Luecken & Lemery-Chalfant, 2009; Fletcher & Sarkar, 2013). Similarly, positive adaptation to adversity represents a wide range of possible psychological, emotional and behavioural processes and outcomes. Although some researchers have contended that in the face of extreme adversity such as mass trauma events, the absence of psychopathological responses may be sufficient to determine positive

adaptation (Fletcher & Sarkar, 2013), others argue that resilience represents more than simply the absence of psychopathology (Bonanno, 2004; Davydov, Stewart, Ritchie & Chaudieu, 2010). Although individual responses to adverse events must be understood relative to the severity of the adverse event experienced, there is some agreement that positive adaptation reflects a "*competent*" response to adversity, in terms of continued psychological, emotional and interpersonal functioning and subjective wellbeing (Davydov, Stewart, Ritchie & Chaudieu, 2010; Fletcher & Sarkar, 2013; Luthar, Cicchetti & Becker, 2000). An additional point of controversy pertains to the trajectory of such positive adaptation. Although some studies propose that disruptions in functioning do not necessarily preclude resilience if the individual is able to recover quickly, it is generally accepted that resilient individuals are able to consistently maintain relatively stable levels of functioning over time and that this is a distinctly different trajectory to that of recovery (Bonanno, 2004; Davis, Luecken & Lemery-Chalfant, 2009).

Furthermore, the terms *resilience* and *coping* with adverse events are often used interchangeably. These concepts are similar but unique; coping refers to the process of dealing with these events using cognitive and behavioural strategies available to the individual, not always with optimal outcomes, whereas resilience is a broader construct pertaining to positive psychological adaptation to stress and the maintenance of a psychological equilibrium (Bonanno, 2004; Campbell-Sills, Cohan & Stein, 2006; Fletcher & Sarkar, 2013).

As resilience includes the ability to resist psychopathological responses to adversity, resilience and vulnerability have been conceptualised as extremes on the same continuum (Campbell-Sills, Cohan & Stein, 2006). This is not to say, however, that factors associated with resilience are merely antonyms of risk factors for psychological distress (Rutter, 1987). The ability to maintain cognitive and emotional stability in the face of adversity has been

related to a range of internal factors such as coping self-efficacy, personal competence, hardiness, self-esteem, optimism, tolerance of negative affectivity and capacity for positive emotions, extraversion, conscientiousness and action-oriented problem solving and coping strategies (Bensimon, 2012; Bonanno, 2004; Campbell-Sills, Cohan & Stein, 2006; Chang & Sanna, 2003; Connor & Davidson, 2003; Olff, Langeland & Gersons, 2005; Philippe, Lecours & Beaulieu-Pelletier, 2009). Demographic and event-specific predictors of resilience have also been examined. Higher levels of education and income, social support, lower levels of trauma exposure severity and fewer experiences of stressful life events have been found to be associated with positive adaptation to adversity (Benight, 2012; Bonanno, Galea, Bucciarelli & Vlahov, 2007).

Despite the conceptual and methodological difficulties defining resilience and associated terminology, the construct of psychological resilience is a useful and important one in research on trauma. Reviews such as those conducted by Bonanno (2012), Fletcher and Sarkar (2013) and Luthar, Cicchetti and Becker (2000) have provided a foundation for a more unified and scientifically valid approach to understanding and measuring resilience. Outcomes of studies conducted on psychological resilience suggest that a complex interaction of individual and personality characteristics, event-specific variables, as well as specific coping strategies and skills underlie resilient responses to adversity. Processes that contribute to positive adaptation, particularly after natural disasters, is as yet a relatively under-researched area worthy of further investigation.

1.6. Association of Trauma and Alcohol Use

Although most individuals do not develop mental illness as a result of exposure to trauma, it has been well documented that exposure to potentially traumatic events such as natural disasters is associated with a host of negative psychological and behavioural

outcomes. Substance use disorders, particularly substance abuse and substance dependence, are examples of such negative outcomes that have been studied extensively.

Rates of substance use disorders tend to be higher among those who have experienced traumatic events, especially those who exhibit symptoms of posttraumatic stress or high levels of impulsivity (Boscarino, Adams & Galea, 2006; Carlson & Dalenberg, 2000; Edwards, Dunham, Ries & Barnett, 2006; Marshall-Berenz, Vujanovic & MacPherson, 2011; Stewart, 1996). For example, childhood trauma has been associated with an increased risk of adolescent and adult alcohol and substance use disorders, possibly as a result of dysregulated biological stress response systems (De Bellis, 2002). Moreover, Del Gaizo et al. (2011) reported that exposure to any kind of traumatic event is associated with increased rates of alcohol abuse and drug consumption. Not all studies, however, find this pattern of association between trauma and problematic substance use. Breslau, Davis and Schultz (2003) found that while exposure to trauma increased the risk of illicit *drug* abuse and dependence among those with posttraumatic stress disorder, such exposure was not associated with *alcohol* abuse or dependence. Thus, it has not been conclusively determined whether posttraumatic stress responses increase the risk for substance use disorders, or whether other factors may underlie both posttraumatic stress disorder and substance misuse post-trauma.

Less research has been conducted on the relations of mass trauma and non-pathological levels of alcohol use. While this is a relatively under-researched area, studies that have examined this relation tend to report increases in alcohol consumption, even long after exposure to the actual event (Boscarino, Adams & Galea, 2006; Cerda, Tracy & Galea, 2011; Grieger, Fullerton & Ursano, 2003; Pfefferbaum & Doughty, 2001; Vetter, Rossegger, Rossler, Bisson & Endrass, 2008; Vlahov et al., 2004). These findings tend to be in line with the dose-response effect of trauma, such that greater levels of exposure to trauma are usually associated with higher levels of alcohol consumption and binge drinking than lower levels of

exposure (Boscarino, Adams & Galea, 2006; Cerda, Tracy & Galea, 2011; Vetter, Rossegger, Rossler, Bisson & Endrass, 2008). For example, Boscarino, Adams and Galea (2006) analysed alcohol use and misuse in a random sample of 1681 adults from New York City after the September 11 2001 terrorist attacks. Compared to one year prior to the disaster, participants reported consuming more alcoholic drinks per month, and increasing the typical number of drinks they consumed per drinking episode up to two years after exposure to the event. Males reported higher levels of alcohol consumption per month than females. Consistent with the dose-response effect, greater exposure to the disaster was associated with higher levels of alcohol consumption and binge drinking. Vlahov et al. (2004) also reported the same trend of increased alcohol consumption in their sample exposed to the September 11 terrorist attacks up to nine months after the event, with 17.5% of participants reporting such an increase.

Recently, Cerda, Tracy and Galea (2011) examined the contribution of exposure to potentially traumatic events (Hurricanes Katrina and Rita) to alcohol use and binge drinking. This prospective study utilised data on frequency and quantity of alcohol consumption that was collected prior to, and post-exposure to the hurricane(s). Results showed that the number of alcoholic drinks consumed in the past 12 months increased as a function of the number of hurricane-related traumatic events the individual was exposed to. The likelihood of engaging in binge drinking behaviour was also significantly elevated among the hurricane-exposed sample compared with those who were not exposed. Individuals most at risk of increased alcohol use post-disaster were those from low-income households, those with low levels of social support and those who had experienced prior traumatic events in their lifetime.

Findings from these studies suggest that experiencing disaster-related trauma results in a greater risk of increased alcohol use and binge drinking. This trend of increased alcohol use after exposure to a mass trauma is not always evident, however, particularly cross-

culturally, with some studies reporting no changes or even decreases in alcohol consumption after exposure to traumatic events (Nordlokken, Pape, Wentzel-Larsen & Heir, 2013; Shimizu et al., 2000; Woersching & Snyder, 2004). Nordlokken, Pape, Wentzel-Larsen and Heir (2013) reported that although more severe levels of exposure to a tsunami were associated with greater self-perceived changes in alcohol use when compared with lower levels of exposure, this relationship was polarised; greater severity of traumatic exposure was associated with both increases and decreases in alcohol use. However, these relationships were no longer significant when participants' level of posttraumatic stress was taken into consideration. In addition, objective measures of current alcohol use revealed no differences in alcohol consumption between those exposed and not exposed to the tsunami, indicating that self-perceptions of changes in alcohol use may be influenced by the distress felt in relation to the trauma.

Although past research has identified a gender difference in alcohol consumption such that males report drinking significantly more than women and evidence an increased risk of developing substance use disorders (Kerr-Correa, Igami, Hiroce & Tucci, 2007; Nolen-Hoeksema, 2004), gender differences in alcohol use post-trauma have been less well studied. In their study, Vetter, Rossegger, Rossler, Bisson and Endrass (2008) reported increased alcohol use after tsunami exposure, with males (14.8%) significantly more likely to report an increase in their use than females (9.4%). It was reported that both higher levels of traumatic exposure and symptoms of posttraumatic stress disorder were associated with greater odds of increased alcohol and substance use among those exposed to the tsunami. Furthermore, increased alcohol use post-disaster predicted concurrent increases in use of medications and cigarettes among women, and increases in cigarette and cannabis use among men. The authors suggested that increases in substance use post-disaster may have reflected coping strategies employed in an attempt to alleviate distress associated with the trauma, however

reasons for substance use were not assessed directly, limiting the ability to make such conclusions. A major limitation of the study is the way the authors determined whether changes in alcohol use had occurred; participants were asked whether or not they had increased their alcohol consumption since the tsunami. A prospective study design is not always possible, however asking participants about the frequency and quantity of alcohol consumption before and after the tsunami is likely to have increased the reliability of their findings.

Taken together, these findings underscore the importance of identifying non-pathological increases in alcohol use post-disaster, given the adverse health effects of moderate alcohol consumption and the increased risk of concurrent nicotine and drug use among those who increase their drinking after a natural disaster (Vetter, Rossegger, Rossler, Bisson & Endrass, 2008; WHO, 2007).

1.7. Effects of Repeated or Ongoing Exposure to Adverse Events

Studies examining psychological adjustment after mass trauma, as outlined in the previous sections, have tended to focus on isolated events such as terrorist attack, tsunami, flood and fire. While there is some research on the psychological effects of exposure to repeated or ongoing mass trauma, most longitudinal studies tend to focus on man-made events such as war or terrorism (Bonanno, 2012; Hobfoll et al., 2009; Neria, Nandi & Galea, 2008). There is a lack of research on the long-term effects of ongoing exposure to natural disasters, such as the sequence of earthquakes and aftershocks in Canterbury.

Research examining the effects of repeated or ongoing exposure to adversity highlights two common stress response patterns, namely those of *accumulation* and *accommodation.* Many studies have found that cumulative adversity, whether it be in the form of multiple experiences of various potentially traumatic events, or long-term exposure to ongoing

adversity, is associated with higher levels of psychological distress and psychopathology than exposure to isolated traumatic experiences (Rossman, 2000; Turner & Lloyd, 1995). The accumulation model is consistent with dose-response effect of trauma, as multiple experiences of trauma arguably approximate higher levels of trauma severity.

In his longitudinal study, Rossman (2000) described the psychological effects of exposure to violence over a period of 11 months among a sample of children aged 5-14 years. Rossman reported that his results largely fit with the accumulation model of stress, however his findings were complex. Although those who experienced higher levels of trauma or were exposed to trauma for longer periods of time showed poorer outcomes overall, children's level of psychological distress tended to decrease over time, and patterns of symptomatology varied depending on factors other than severity of trauma, such as gender, type of trauma and parental factors.

In a related vein, Bleich, Gelkopf and Solomon (2003) and Bleich, Gelkopf, Melamed and Solomon (2006) examined psychological functioning in a community sample after 19 and 44 months of exposure to ongoing terrorism in Israel and reported similarly mixed findings. The authors reported that while rates of posttraumatic stress disorder remained unchanged and traumatic stress-related symptoms had increased, they found relatively low levels of distress overall, lower rates of depression, improved functioning and increased sense of safety in their sample at the 44 month follow-up. This pattern of positive psychological adjustment over time has been proposed to reflect accommodation to ongoing stress, where individuals learn to adapt to adverse experiences, resulting in reductions in psychological distress over time. Habituation has been hypothesised to underlie the accommodation effect. Habituation refers to a learning process in which an individual's response to a stimulus decreases in magnitude as a result of repeated exposure to such (Grissom & Bhatnagar, 2009). Thus, disruptions in functioning may occur during initial stages of the accommodation

process. In the case of exposure to earthquakes, habituation would mean that individuals' stress responses to stimuli associated with the disaster, such as continued aftershocks, would decrease as these recur.

In summary, there is evidence for both the accumulation and accommodation models in existing trauma research, however the relationship between ongoing traumatic events and psychological outcomes does not appear to be as straightforward as these models may suggest. Given the mixed findings, predicting psychological adjustment is more complex than looking at severity or timeframe of traumatic exposure; although research consistently finds links between these two factors, moderating variables have been proposed. In addition to the demographic and event-specific factors outlined previously, psychological and behavioural characteristics relating to vulnerability and resilience to psychopathology may play an important role in understanding these relationships. While exposure to ongoing natural disasters may produce psychological outcomes that follow the pathways of resilience, recovery or severe functional disruption, more research is needed to delineate the processes underlying response trajectories related to ongoing adversity. Arguably, those who accommodate to ongoing stressful events in their lives might be more likely to recover from these events, or maintain psychological stability as seen in resilient responses. The potential relationship between psychological resilience and accommodation to ongoing stress has not been systematically examined, but warrants further consideration.

The effect of ongoing adversity on alcohol consumption is also in need of clarification. Studies reporting that alcohol use tends to increase after exposure to potentially traumatic events were conducted after single events such as hurricane, tsunami and terrorist attack (Boscarino, Adams & Galea, 2006; Cerda, Tracy & Galea, 2011; Nordlokken, Pape, Wentzel-Larsen & Heir, 2013; Vetter, Rossegger, Rossler, Bisson & Endrass, 2008). Very few studies have examined alcohol use after ongoing natural disasters, and these have yielded

inconclusive findings. Shimizu et al. (2000) reported decreases in the quantity of alcohol consumed up to two years after the onset of an earthquake sequence in Japan, and Woersching and Snyder (2004) found no significant changes in alcohol use post-earthquake in El Salvador. However, only 7% of participants in the latter study reported that they had consumed alcohol prior to the earthquake. The authors noted that this low baseline prevalence is consistent with cultural standards in El Salvador. Thus, similar findings are unlikely in New Zealand, where 85% of the adult population reported drinking alcohol within the last 12 months (Ministry of Health, 2009).

A dose-response effect of trauma on alcohol use has been found in other studies, such that higher levels of trauma severity are associated with increased alcohol use (Boscarino, Adams & Galea, 2006; Cerda, Tracy & Galea, 2011; Vetter, Rossegger, Rossler, Bisson & Endrass, 2008). If repeated or ongoing exposure to trauma equates to higher levels of trauma severity, and exposure to a single potentially traumatic event is sufficient to lead to increased alcohol consumption, it would be reasonable to expect that exposure to the Canterbury earthquake sequence would be associated with subsequent increases in alcohol use.

1.8. Relations Between Alcohol Use, Motivations for Drinking and Resilience

Motivations for consuming alcohol are highly variable, however researchers consistently identify drinking motives which relate to the reinforcing effects of alcohol (Blackwell & Conrod, 2003; El-Guebaly, 2007; Kuntsche, Knibbe, Gmel & Engels, 2005; Kuntsche & Cooper, 2010; Lee, Maggs, Neighbors & Patrick, 2011; Park, 2004; Patrick & Maggs, 2008; Simons, Correia & Carey, 2000). In models of operant conditioning, reinforcement describes a form of learning, whereby behaviour is strengthened by its consequences (Ferster & Skinner, 1957). Positive reinforcement refers to the strengthening of

a behaviour due to associated favourable outcomes; negative reinforcement strengthens a behaviour due to the removal of negative outcomes.

Alcohol can have both internal (within the individual) and external (outside the individual), positively and negatively reinforcing effects, making alcohol consumption more likely to continue after reinforcing drinking experiences. These types of reinforcement combine to produce four main motives for drinking: enhancement, social, conformity and coping motives (Blackwell & Conrod, 2003; Conrod, Peterson & Pihl, 2001; Cooper, 1994; Grant, Stewart, O'Connor, Blackwell & Conrod, 2007; Treeby & Bruno, 2012; Wilkie & Stewart, 2005). Enhancement motives for drinking are reported by individuals who drink to enhance positive mood states, a form of internal positive reinforcement. Social motives, such as social acceptance or approval, represent external positive reinforcement. Conformity motives refer to reasons for drinking such as avoiding social costs associated with abstinence, such as peer rejection; this is underpinned by external negative reinforcement. Finally, coping motives for drinking refers to consuming a substance in an attempt to manage unpleasant symptoms such as psychological stress (which results from the perception that ones coping capacity is strained or overwhelmed by environmental demands), and to reduce internal negative affective states such as sadness, anxiety or anger (Cohen, Janicki-Deverts & Miller, 2007). These motives are associated with internal negative reinforcement.

Research on the differences between males' and females' motivations for drinking has produced mixed findings. Cooper (1994) reported that males were more likely than females to report enhancement, social and conformity motives. Grant, Stewart, O'Connor, Blackwell and Conrod (2007) also reported higher levels of social motives among males than females, but no differences in enhancement, coping or conformity motives between the genders. Mezquita, Stewart and Ruiperez (2010) found that males were more likely than females to report enhancement motives for drinking, but not more likely than females to report social,

coping or conformity motives. To date, no consistent gender differences have been found in coping motives for drinking, partly due to a lack of research examining such gender differences.

Coping motives for drinking are often reported, both by those in the general population and by those who have experienced potentially traumatic events (Bleich, Gelkopf & Solomon, 2003; Dixon, Leen-Feldner, Ham, Feldner & Lewis, 2009; Grant, Stewart, O'Connor, Blackwell & Conrod, 2007; Medina et al., 2011). For example. Bleich, Gelkopf and Solomon (2003) found that 5.3% of their sample used alcohol or cigarettes to cope with the effects of ongoing terrorism. Further, studies have shown that both adolescents and adults may drink to cope with an array of posttraumatic stress symptoms (Dixon, Leen-Feldner, Ham, Feldner & Lewis, 2009; Edwards, Dunham, Ries & Barnett, 2006; Stewart, Mitchell, Wright & Loba, 2004). One recent study found that adolescents with symptoms of posttraumatic stress disorder were more likely to report coping-related drinking motives (Dixon, Leen-Feldner, Ham, Feldner & Lewis, 2009). Similarly, trauma-exposed alcohol using individuals who reported lower levels of vigorous intensity aerobic exercise were more likely to endorse coping-based motives for alcohol use (Medina et al., 2011). Among volunteer responders to the 1998 Swissair flight disaster, frequency and severity of posttraumatic stress disorder symptoms were positively correlated with coping motivated drinking and with alcohol use to forget (Stewart, Mitchell, Wright & Loba, 2004).

Drinking to cope with negative affect has been found to relate to increased frequency and quantity of alcohol use, poorer psychological functioning and problematic patterns of alcohol consumption (Cooper, 1994; Goldstein, Flett & Wekerle, 2010; Grant, Stewart & Mohr, 2009; Grant, Stewart, O'Connor, Blackwell & Conrod, 2007; Kuntsche, Knibbe, Gmel & Engels, 2005; Olff, Langeland & Gersons, 2005; Stappenbeck, Bedard-Gilligan, Lee & Kaysen, 2013). These findings are consistent with the self-medication hypothesis, which

postulates that individuals who misuse alcohol do so to alleviate negative affect and psychological distress often associated with psychological disorders such as posttraumatic stress disorder, depression and anxiety (Khantzian, 1997). For example, Mezquita, Stewart & Ruiperez (2010) found that participants who reported drinking to cope with feelings of depression and anxiety were more likely to display traits of neuroticism and low levels of conscientiousness, and that these coping motives predicted alcohol-related problems, such as interpersonal difficulties and neglecting occupational responsibilities.

There is a striking lack of research on the relationship between psychological resilience and alcohol use among trauma-exposed populations. Green, Beckham, Youssef and Elbogen (2014) recently reported that resilience was negatively related to alcohol abuse and dependence in a sample of trauma-exposed war veterans. This is consistent with the previously proposed conceptualisation of resilience as the capacity to resist psychopathological responses to adversity, including alcohol misuse. Similarly, Bonanno, Galea, Bucciarelli and Vlahov (2007) reported that resilience was predicted by substance use (marijuana, alcohol and cigarettes) abstinence among a sample exposed to a terrorist attack.

In summary, existing research suggests that alcohol is often used to avoid or reduce negative affect and stress-related symptoms following traumatic event exposure, however this research centres on samples that exhibit significant levels of psychological distress, and on potentially traumatic events of a man-made nature. Drinking alcohol to cope may have both positive and negative impacts on psychological health and resilience post-disaster, however the nature of these relations remain poorly understood. Although coping-based motives for drinking tend to be associated with negative psychological adjustment post-trauma, studies have not examined whether resilient individuals also use alcohol to cope with negative affective states after they experience adverse events. This is possible, given that there are potential psychological benefits for moderate substance use after exposure to mass trauma,

such as a reducing negative affect and stress levels (Conrod, Peterson & Pihl, 2001; Peele & Brodsky, 2000; Wilkie & Stewart, 2005). It would be worth investigating how resilience and non-pathological alcohol use relate to one another and to motivations for drinking, particularly post-disaster. Doing so would further the scientific knowledge base with regard to why resilient people consume alcohol post-trauma, whether their motivations for drinking are related to frequency and quantity of alcohol consumption and whether or not alcohol use behaviours are a cause for concern among this population after exposure to a natural disaster.

1.9. Summary

Existing research has shown that exposure to potentially traumatic events such as natural disasters is associated with negative psychological and behavioural outcomes, including symptoms of posttraumatic stress disorder, depression, anxiety and increases in substance use (Boscarino, Adams and Galea, 2006; Bryant et al., 2006; Cerda, Tracy & Galea, 2011; Priebe et al., 2011; Zhang, 2011). Studies tend to show a dose-response effect of traumatic exposure, whereby those exposed to more severe levels of trauma tend to exhibit higher levels of psychological distress (Freedy, Saladin, Kilpatrick, Resnick & Saunders, 1994; Neria, Nandi & Galea, 2008; Lai, Chang, Connor, Lee & Davidson, 2004). Nonetheless, resilient responses to adverse events also appear to be relatively common (Bonanno, 2004; Campbell-Sills, Cohan & Stein, 2006).

Alcohol is currently the most commonly consumed recreational drug among adults in this country, with men drinking significantly more than women (Ministry of Health, 2009). Alcohol consumption has the capacity to exert both acute and chronic adverse effects on physical, mental, interpersonal and occupational functioning (Ministry of Health, 2009; World Health Organization, 2007). Conversely, psychological benefits have been associated

with moderate alcohol use in some studies **(**Maes, Delmeire, Mylle & Altamura, 2001; Peele & Brodsky, 2000; Wilkie & Stewart, 2005)**.**

Alcohol consumption tends to increase significantly in the community following a potentially traumatic event, particularly as the level of traumatic exposure increases (Boscarino, Adams and Galea, 2006; Cerda, Tracy and Galea, 2011). Furthermore, coping-based motives for drinking are commonly reported in trauma-exposed populations, and drinking to cope with negative affect is associated with increased frequency and quantity of alcohol consumption (Bleich, Gelkopf & Solomon, 2003; Cooper, 1994; Dixon, Leen-Feldner, Ham, Feldner & Lewis, 2009; Grant, Stewart, O'Connor, Blackwell & Conrod, 2007; Marshall-Berenz, Vujanovic & MacPherson, 2011; Vujanovic, Bonn-Miller & Marlatt, 2011).

1.10. The Current Study

Past research on stress and trauma and their association with alcohol use has largely focused on alcohol use disorders among psychologically distressed populations, rather than patterns of non-disordered alcohol consumption or alcohol use among those who adapt positively to trauma. The current study on the other hand aimed to examine the effects of the Canterbury earthquake sequence on non-problematic alcohol consumption among a group of resilient individuals. The Canterbury earthquake sequence provided a unique opportunity to examine and understand post-disaster drinking behaviour, and how such behaviour might be related to psychological resilience and psychopathology. In accordance with Fletcher and Sarkar's (2013) recommendations and Bonanno's (2004) definition, resilience was conceptualised as positive psychological adaptation to the earthquakes, where individuals were able to consistently maintain relatively stable levels of functioning and subjective wellbeing since the onset of the earthquake sequence in September 2010. The current study

also examined whether resilient individuals report drinking to cope with negative affective states, and how this relates to frequency and quantity of alcohol consumption. Such knowledge is important not only to promote resilience among the residents of Canterbury, but also to identify warning signs among those more likely to be at risk of developing problematic patterns of drinking. Specific hypotheses are:

1. Participants will report higher levels of alcohol consumption since the earthquakes began.
2. A significant effect of gender on alcohol consumption will be found among participants, such that males will exhibit significantly higher levels of pre-earthquake, post-earthquake and current alcohol consumption than females.
3. Participants will report anxiety- and depression-based coping motives for drinking, at levels comparable to, or exceeding those, found by other researchers.
4. Participants' current level of alcohol consumption will correlate positively with the level of traumatic exposure experienced.
5. Participants' current level of alcohol consumption would correlate positively with coping-based motives for drinking.

Given the equivocal findings on the relations between psychological resilience, alcohol consumption and drinking motives, two further exploratory aims were proposed. It was investigated whether psychological resilience was associated with patterns of alcohol consumption and motivations for drinking. The directionality of these relationships was also examined, as were gender differences in participants' motives for drinking, and in the pattern of alcohol use over time.

CHAPTER TWO

2. METHOD

2.1. Participants

Participants were individuals who experienced one or more of the major Canterbury earthquakes and/or earthquake-related stressors, and self-identified as coping well with these experiences. A sample of 104 such individuals were assessed. Participants were recruited from the wider community using advertisements in local newspapers (The Press and The Star) and public notices (see Appendix A) placed in local libraries, shops and tertiary institutions, and by snowball sampling, where individuals known to investigators or other study participants were recruited by word of mouth. Because the current study involves hypotheses related to alcohol consumption, those who indicated that they had not consumed alcohol since the Canterbury earthquake sequence began were excluded from the analyses, resulting in a sample of ninety-one particpants (M = 30, F = 61). Participants ranged in age from 18 to 72 years (*M* = 50.18 years, *SD* = 10.74). The majority of participants indicated that they were of New Zealand European descent (n = 72), however a large proportion (n = 16) of the sample identified with "*other*" ethnicities not listed on the demographics questionnaire, these were: British (n = 4), New Zealand European and Māori (n = 2), German (n = 2), New Zealand European and Canadian (n = 1), New Zealand European and Chinese (n = 1), New Zealand European and German (n = 1), European and Chinese (n = 1), Caucasian (n = 1), New Zealander (n = 1), Irish (n = 1) and Australian (n = 1). The sociodemographic characteristics of the sample are presented in Table 1.

Table 1
Sample Sociodemographic Characteristics

Characteristic	n	%
Gender		
Male	30	32.97
Female	61	67.03
Age (years)		
18-30	5	5.49
31-45	22	24.18
46-65	57	62.64
>65	7	7.69
Ethnicity		
New Zealand European	72	79.12
Māori	1	1.10
Cook Island Māori	1	1.10
Indian	1	1.10
Other	16	17.58
Relationship status		
Single	12	13.19
Married/committed partnership	63	69.23
Divorced/separated	12	13.19
Widowed	4	4.40
Education		
1-4 years high school	5	5.49
5-6 years high school	7	7.69
Trade or technical certificate	8	8.79
Bachelor degree/diploma	42	46.15
Postgraduate degree	29	31.87
Occupation		
Full or part-time student	5	5.49
Full or part-time wage/salary earner	73	80.22
Unemployed	1	1.10
Home responsibilities	4	4.40
Retired or not working by choice	7	7.69
Sickness or invalid benefit	1	1.10

2.2. Procedure

Ethical approval was obtained for the study from the Upper South A Regional Ethics Committee. Data were collected over a 13 month period between October 2012 and November 2013, which was between two and three years after the onset of the earthquake sequence in September 2010.

Advertisements and public notices requested individuals who self-identified as "*coping reasonably well*" with earthquake-related experiences to contact the research team at the Department of Psychological Medicine, University of Otago, Christchurch. Potential participants were screened for eligibility by telephone to ensure that they had been exposed to one or more of the major Canterbury earthquakes and/or earthquake-related events, and that they met criteria for psychological resilience (see Appendix B for the screening form). Exposure to earthquake-related events included witnessing fallen buildings, being trapped, seeing injured or deceased people, job or school disruption, property or land damage, financial losses and death or injury of family members or friends, or other adverse consequences directly associated with the earthquakes. In addition to participant self-identification of subjective wellbeing since the earthquakes, indicating positive psychological adaptation to earthquake-related experiences, resilience was conceptualized as the absence of psychological symptoms related to the earthquakes such as severe distress, anxiety, mood or sleep disturbance, hyperarousal, avoidance of earthquake-related stimuli, re-experiencing, flashbacks, nightmares, problem alcohol or drug use and suicidality, using Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV-TR; American Psychiatric Association, 2000) definitions for symptoms when given. Individuals who reported such symptoms were excluded from participation in the study. Additionally, in order to maintain the integrity of the resilient nature of the sample, individuals were excluded from participation if they had received treatment for earthquake-related distress or met criteria for

a current Axis I diagnosis as defined by the DSM-IV-TR (American Psychiatric Association, 2000). Thirteen participants met exclusion criteria either after screening or after participation in the study, and received mental health referrals as appropriate.

Individuals were given an initial description of the project during telephone screenings. All screenings were discussed with the research team at weekly meetings to facilitate consistent decision making regarding individuals' eligibility to participate. Upon confirmation of eligibility and willingness to participate, participants were assigned unique identification numbers to ensure data anonymity.

Screened participants were then invited to attend an assessment at one of two Christchurch locations, decided due to convenience for the participant; the University of Canterbury in Ilam, or the Department of Psychological Medicine, University of Otago, Christchurch, in the central business district. Participants were given a detailed verbal description of the study and provided with an information sheet (see Appendix C) outlining the purpose of the study, and the process of participation and data management procedures. After complete description of the study to the participants, written informed consent was obtained (see Appendix D for the consent form).

Assessments lasted for approximately 3 hours, during which participants completed the following, in the order listed: i. a semi-structured interview (see Appendix E for interview guidelines), ii. a structured clinical interview (the Mini-International Neuropsychiatric Interview; Sheehan et al., 1998; not reproduced in the Appendices due to copyright), iii. a battery of self-report questionnaires, iv. a range of neuropsychological tasks and iv. physiological measures (heart rate variability and instructions for collecting salivary cortisol levels). Neuropsychological and physiological data will not be reported as part of the current study. The semi-structured interview was developed for the wider community study. For the purposes of the current study, the interview was used to confirm individuals' suitability for

participation in terms of their exposure to earthquake-related events and resilience. Three main areas were explored in this interview: participants' exposure to the Canterbury earthquakes and their effects, how participants coped with their experiences, and whether they noted any positive effects from these experiences.

The Mini International Neuropsychiatric Interview (M.I.N.I.) is a structured clinical interview compatible with DSM-IV diagnostic criteria. The M.I.N.I. has demonstrated diagnostic sensitivity and specificity, and good to excellent levels of inter-rater and test-retest reliability (Lecrubier et al., 1997; Sheehan et al., 1997; Sheehan et al., 1998). The M.I.N.I. was used to assess the presence of the major DSM-IV Axis I psychiatric disorders, including substance use disorders. Those who met criteria for a current Axis I diagnosis were excluded from participation in order to maintain sample homogeneity with respect to psychological resilience, as previously outlined.

2.3. Measures

The current study utilised a questionnaire battery compiled for the larger community research project comprising 16 self-report questionnaires measuring psychological, emotional and behavioural functioning, as well as exposure and responses to the earthquakes and their effects. Participants were asked to report on the following demographic variables: age, gender, education, occupation, marital status and ethnicity. The marital status section had a "*married/committed partnership*" response category, combining those who were married and those who deemed themselves to be in a "*committed partnership*", defined as an exclusive long-term romantic relationship with another person, into one category. The occupation section included a "*home responsibilities*" response option for those who were on parental

leave, or had chosen not to work in order to care for child(ren). The four self-report questionnaires reported in the current study are described in more detail.

2.3.1. Alcohol Use Disorders Identification Test – Consumption

The Alcohol Use Disorders Identification Test – Consumption (AUDIT-C) is an abbreviated version of the AUDIT (Saunders, Aasland, Babor, de la Fuente & Grant, 1993, see Appendix F). The AUDIT is a 10-item questionnaire developed in collaboration with the World Health Organization (WHO) to identify individuals exhibiting problematic alcohol consumption behaviours. The AUDIT-C is comprised of the first three items of the AUDIT, and was used to measure participants' alcohol consumption. Item 1 measures frequency of alcohol use ("*how often did you have a drink of alcohol*") and is rated on a 5-point Likert scale (ranging from 0 = "*never*" to 4 = "*4 or more times a week*"). Item 2 assesses typical quantity of alcohol consumed ("*how many drinks containing alcohol did you have on a typical day when you were drinking*") and is rated on a 5-point Likert scale (ranging from 0 = "*1 or 2*" to 4 = "*10 or more*"). Item 3 refers to frequency of binge drinking ("*how often did you have 6 or more drinks on one occasion?*"), and is also rated on a 5-point Likert scale (ranging from 0 = "*never*" to 4 = "*daily or almost daily*"). Response to these three questions combine to produce a 'Total Alcohol Consumption' score, which can range from 0-12.

Participants were asked to complete the AUDIT-C for three time points in order to capture changes in alcohol consumption across time. These time points were: "*Before the Earthquakes*" (Time 1), which referred to participants' alcohol consumption patterns before the first earthquake in September 2010; "*Since the Earthquakes*" (Time 2), which pertained to alcohol consumption since the largest earthquakes which occurred in September 2010 and

February 2011; and "*In the Last Month*" (Time 3), which measured current alcohol consumption.

Psychometric properties of the AUDIT and the AUDIT-C are well-established **(**Allen, Litten, Fertig & Babor, 1997; Bohn, Babor & Kranzler, 1995; Bradley et al., 2003; Bush, Kivlahan, McDonell, Fihn & Bradley, 1998; Rist, Glockner-Rist & Demmel, 2009; Saunders et al., 1993). Initial AUDIT development research included 1888 individuals across six countries (Australia, Bulgaria, Kenya, Mexico, Norway and the United States of America), demonstrating that the AUDIT questions have adequate face validity and can be used across a range of cultures (Saunders, Aasland, Babor, de la Fuente & Grant, 1993). In their systematic reviews of research on the psychometric properties of the AUDIT, Meneses-Gaya, Zuardi, Loureiro and Crippa (2009) and Reinert and Allen (2007) found average internal consistency coefficients of .80 and .83, respectively. Both studies reported high sensitivity and specificity values and acceptable test-retest reliabilities. In addition, Bohn, Babor and Kranzler (1995) found satisfactory construct validity; correlations between the AUDIT and a variety of related measures, such as the MacAndrew Alcoholism Scale and the Michigan Alcoholism Screening Test*,* were such that concurrent validity was demonstrated, and the AUDIT was able to discriminate between populations exhibiting problematic and non-problematic alcohol use, indicating good discriminant validity. The AUDIT-C has been used in clinical and research settings when a shorter version of the AUDIT is needed, and has demonstrated adequate psychometric properties comparable to those of the full 10-item version of the scale. High internal consistency, sensitivity and specificity, test-retest reliability and concurrent validity have been reported in both clinical and non-clinical samples (Bradley et al., 2003; Bush, Kivlahan, McDonell, Fihn & Bradley, 1998; Frank, et al., 2008; Meneses-Gaya, Zuardi, Loureiro and Crippa, 2009; Meneses-Gaya et al., 2010; Reinert & Allen, 2007).

2.3.2. Modified Drinking Motives Questionnaire – Revised

Motives for drinking were assessed using the Modified Drinking Motives Questionnaire – Revised (MDMQ-R, Blackwell & Conrod, 2003, see Appendix G). This questionnaire consists of 28 items that load onto five factors (Grant, Stewart, O'Connor, Blackwell & Conrod, 2007); Social, Enhancement, Conformity and Coping Motives for drinking, with Coping Motives split into Coping – Depression and Coping – Anxiety dimensions. These factors correspond to the questionnaire's five subscales of the same names. The scale has demonstrated adequate psychometric properties for research purposes among adult populations.

Participants are asked to report how often they consume alcohol for the reason specified in each question. The Social subscale consists of items pertaining to external positive reinforcement associated with alcohol consumption in social settings, such as *"because it makes a social gathering more enjoyable".* Enhancement motives refers to internal positive reinforcement gained from alcohol consumption, such as *"because it makes me feel good"*. The Coping – Depression and Coping – Anxiety subscales contain items such as *"to forget painful memories"* and *"to reduce my anxiety"* respectively, which reflect negative reinforcement gained from alcohol use. The Conformity motives also present negative reinforcement motives for alcohol use, such as *"so I won't feel left out"*.

All items are rated on a 5-point Likert scale ranging from 1 = *"never/almost never"* to 5 = *"always/almost always",* and each question is scored from 1-5 accordingly. Higher scores indicate increased endorsement of the specified motive for alcohol use.

2.3.3. Traumatic Exposure Severity Scale

The Traumatic Exposure Severity Scale (TESS, Elal & Slade, 2005, see Appendix H) was used to measure participants' level of exposure to earthquake-related trauma and the distress associated with their experiences. The TESS consists of 24 items, which load onto 5 factors: i. resource loss/being in need, ii. damage to home and goods, iii. personal harm/threat, iv. concern for significant others and v. exposure to the grotesque (Elal & Slade, 2005). In the current study, 15 items were added in order to gain information about acute earthquake exposure and secondary stresses; these items are not included in statistical analyses for the current study, as their use has not been validated.

Participants are asked to circle either "*yes*" or "*no*" to indicate whether or not they experienced the scenario in question; this yields a total Occurrence score. Those who respond with "*yes*" are asked to rate how distressing this experience was on a 5-point Likert scale ranging from 1 = *"not at all distressing"* to 5 = *"extremely distressing",* which yields a total Distress score. Higher scores on the Occurrence scale indicate greater level of exposure to earthquake-related trauma, and higher scores on the Distress scale represent greater levels of distress.

The TESS demonstrates satisfactory psychometric properties. In their development study, Elal and Slade (2005) reported an internal reliability coefficient of .78, as well as evidence of convergent and discriminant validity.

2.3.4. Connor-Davidson Resilience Scale

Participants' psychological resilience was assessed using the Connor-Davidson Resilience Scale (Connor & Davidson, 2003; not reproduced in the Appendices due to copyright). The Connor-Davidson Resilience Scale (CD-RISC) consists of 25 items, which

load onto 5 factors: i. a sense of personal competence (e.g. "*I believe I can achieve my goals, even if there are obstacles*"), ii. being able to tolerate negative affect, having confidence in one's instincts and a sense that stress can facilitate personal strength (e.g. "*Having to cope with stress can make me stronger*"), iii. acceptance of change (e.g. "*I am able to adapt when changes occur*"), iv. control (e.g. "*I feel in control of my life*") and v. spiritual effects (e.g. "*Good or bad, I believe that most things happen for a reason*"). Items are rated on a 5-point Likert scale ranging from 0 = *"not true at all"* to 4 = *"true nearly all the time"*. Higher scores indicate greater psychological resilience.

Previous research has shown that the CD-RISC is a valid and reliable measure of psychological resilience in times of stress or trauma in both clinical and non-clinical populations (Connor & Davidson, 2003; Karairmak, 2010). In a comprehensive review of measures of resilience, Windle, Bennett and Noyes (2011) report that the CD-RISC is psychometrically sound, particularly with regard to construct validity. In their CD-RISC development study, Connor and Davidson (2003) reported an internal consistency coefficient of .89 and test-retest reliability coefficient of .87. Similarly, Karairmak (2010) found evidence of internal consistency of the CD-RISC in his sample of 246 participants who experienced a mass trauma, reporting a Cronbach's alpha coefficient of .92. Karairmak (2010) also reported that the CD-RISC demonstrated good levels of convergent validity; it correlated strongly with other measures of resilience, such as the Ego-Resiliency Scale, $r = .68$, $p < .001$ and positive affect scores on the Positive and Negative Affect Schedule, $r = .69$, $p < .001$.

2.4. Data Analyses

Data were entered into The Progeny database and subsequently extracted and analysed using the Statistical Package for the Social Sciences (SPSS; version 21.0). Descriptive statistics were calculated to determine sociodemographic characteristics of the sample, and to obtain means, standard deviations and score ranges for each variable. MDMQ-R subscale endorsement was determined by calculating the percentage of participants who endorsed (scored 2 or more) at least one item on that subscale, resulting in a mean subscale score greater than 1.0.

Continuous data were assessed for normality visually by examining score distributions on histograms, and statistically by calculating *Z* scores for both skewness and kurtosis, as recommended by Ghasemi and Zahediasl (2012). An absolute score of $Z > 1.96$ is significant at the $p < .05$ level, $Z > 2.58$ is significant at the $p < .01$ level and $Z > 3.29$ is significant at the $p < .001$ level. A minimum alpha level of .05 was used as a significance criterion for all statistical tests. A significant *Z* value was used to infer substantial non-normality (Sirkin, 2006), and nonparametric statistical methods were implemented to examine all non-normally distributed variables.

In order to test hypotheses 1 and 2, Wilcoxon Signed Ranks Tests and Mann-Whitney U Tests were used to determine differences between groups for non-normally distributed data, and student's t-tests were used in order to determine differences between groups for normally distributed data. Welch's t-tests were used to compare mean MDMQ-R scores found in the current study to those obtained by Grant, Stewart, O'Connor, Blackwell and Conrod (2007) in two large community samples in order to test hypothesis 3. Although Welch's t-test is a parametric statistical method and can inflate Type 1 error rates when used with nonparametric data (Erceg-Hurn & Mirosevich, 2008), it was deemed appropriate for use with non-normally distributed data in the current study given that it has been found to be

robust to normality violations when the sample size is large (N > 30), distribution skew is mild to moderate, two-tailed tests are used, and variables are independent (Bridge & Sawilowsky, 1999; Edgell & Noon, 1984; Sawilowsky & Blair, 1992).

Effect sizes were calculated for between-group comparisons and interpreted using Cohen's (1988) criteria of .1 = small effect, .3 = medium effect and .5 = large effect. To test hypotheses 4 and 5 and to address the exploratory aims, Spearman rank order correlation coefficients (i.e. Spearman's rho) were calculated to examine relationships between non-normally distributed variables, and once more, Cohen's (1988) criteria of .1 = weak correlation, .3 = moderate correlation and .5 = strong correlation were implemented. Homogeneity of variance criteria for using the aforementioned statistical tests were examined and satisfied for all relevant variables using Levene's test for parametric data and a non-parametric Levene test (Nordstokke & Zumbo, 2010) for non-normally distributed data.

2.5. Power Analysis

It was determined prior to data collection that a sample size of N = 85 would be sufficient to detect statistically significant correlation coefficients over $r = 0.30$ (2-tailed; $p < 0.05$) and to detect a medium effect size of .30 with adequate power (> 80% at $p < 0.05$) for between group comparisons. Therefore, the final sample size of N = 91 is adequate in order to test the hypotheses outlined previously.

CHAPTER THREE

3. RESULTS

3.1. Distribution and Dispersion of Scores

Statistical analyses revealed that several variables were non-normally distributed; absolute skewness and kurtosis and their corresponding *Z* scores are listed in Table 2. The TESS Occurrence subscale data were normally distributed, however the Distress subscale was positively skewed. With the exception of the Social subscale, all MDMQ-R subscales were positively skewed. AUDIT-C data were positively skewed at all three time points, Before the Earthquakes (Time 1), Since the Earthquakes (Time 2) and In the Last Month (Time 3). The CD-RISC data were also normally distributed. Histograms for each variable are attached in Appendix I.

Table 2

Assessment of Skewness and Kurtosis for the Alcohol Use Disorders Identification Test – Consumption (AUDIT-C), Modified Drinking Motives Questionnaire – Revised (MDMQ-R), Traumatic Exposure Severity Scale (TESS) and the Connor-Davidson Resilience Scale (CD-RISC)

Measure	Skewness (SE)	$Z_{Skewness}$	Kurtosis (SE)	$Z_{Kurtosis}$
Alcohol Use Disorders Identification Test – Consumption				
Total Alcohol Consumption (T1)	.89*** (.25)	3.5	.51 (.5)	1.03
Total Alcohol Consumption (T2)	.85*** (.25)	3.34	.029 (.5)	.058
Total Alcohol Consumption (T3)	.82** (.25)	3.25	.71 (.5)	1.42
Traumatic Exposure Severity Scale				
Occurrence Subscale	.073 (.25)	.29	-.73 (.5)	-1.46
Distress Subscale	.55* (.26)	2.16	-.35 (.51)	.68
Modified Drinking Motives Questionnaire – Revised				
Social Motives	-.14 (.25)	-.53	-.50 (.5)	-1.01
Coping-Anxiety	1.13*** (.25)	4.46	1.11* (.5)	2.21
Coping-Depression	2.09*** (.25)	8.25	3.76*** (.5)	7.53
Enhancement	.89*** (.25)	3.53	.45 (.5)	.89
Conformity	2.93*** (.25)	11.57	8.65*** (.5)	17.3
Connor-Davidson Resilience Scale	-.42 (.25)	-1.67	.68 (.5)	1.35

Note. T1 = Time 1; T2 = Time 2; T3 = Time 3.
* $p < .05$. ** $p < .01$. *** $p < .001$.

3.2. Alcohol Consumption Among the Sample Since the Earthquakes

Table 3 displays participants' frequency of alcohol consumption, quantity of alcohol consumption and binge drinking frequency (as measured by questions 1, 2 and 3 on the AUDIT-C, respectively) since the earthquakes.

Table 3

Percentages of Participant Responses to each Question of the Alcohol Use Disorders Identification Test – Consumption (AUDIT-C) at Time 2 (Since the Earthquakes)

AUDIT-C Question	Response Category (% of Participants)				
How often did you have a drink of alcohol?	*Never*	*Monthly or less*	*2-4 times a month*	*2-3 times a week*	*≥ 4 times a week*
	-	15.4	29.7	23.1	31.9
How many drinks containing alcohol did you have on a typical day when you were drinking?	*1 or 2*	*3 or 4*	*5 or 6*	*7, 8 or 9*	*10 or more*
	76.9	13.2	6.6	3.3	-
How often did you have 6 or more drinks on one occasion?	*Never*	*Less than monthly*	*Monthly*	*Weekly*	*Daily or almost daily*
	62.6	20.9	8.8	6.6	1.1

Table 3 shows that 31.9% of participants reported drinking 4 or more times a week since the earthquakes; 23.1% drank alcohol 2-3 times a week, 29.7% drank alcohol 2-4 times a month and 15.4% consumed alcohol on a monthly basis or less. The majority (76.9%) of participants reported that they typically drank 1-2 alcoholic beverages on the days they consumed alcohol, and none typically drank 10 or more alcoholic beverages. Furthermore,

while most (62.6%) participants had not engaged in binge drinking (six or more drinks on one occasion) behaviour since the earthquakes, 20.9% had done so less than once a month; 8.8% did so monthly, 6.6% of participants reported drinking 6 or more drinks on a weekly basis and 1.1% engaged in binge drinking daily or almost daily.

3.3. Gender Differences in Total Alcohol Consumption

As Total Alcohol Consumption (AUDIT–C) data for all three time points were non-normally distributed, the non-parametric Mann-Whitney U Test was used to examine differences in alcohol consumption between males and females. Table 4 displays the means, standard deviations and ranges of participant Total Alcohol Consumption scores at Time 1, Time 2 and Time 3 for males, females and the total sample.

Table 4

Descriptive Statistics for the Alcohol Use Disorders Identification Test - Consumption (AUDIT-C) for the Total Sample and for Males and Females at Three Time Points: Before the Earthquakes (Time 1), Since the Earthquakes (Time 2) and in the Last Month (Time 3).

Measure	Total Sample N = 91 M (SD)	Males n = 30 M (SD)	Females n = 61 M (SD)
Alcohol Use Disorders Identification Test – Consumption			
Total Alcohol Consumption (T1)	3.51 (2.01)	4.43 (2.52)	3.05 (1.53)
Total Alcohol Consumption (T2)	3.7 (2.18)	4.47 (2.65)	3.33 (1.81)
Total Alcohol Consumption (T3)	3.33 (2.03)	4.20 (2.52)	2.90 (1.59)

Note. T1 = Time 1; T2 = Time 2; T3 = Time 3.

There was a small but significant difference in Total Alcohol Consumption scores between males (*Mdn* = 4.50) and females (*Mdn* = 3.00) $U = 638$, $z = -2.37$, $p = .018$, $r = .25$, with males reporting higher levels of alcohol consumption before the earthquakes. No significant difference in alcohol consumption was found between males (*Mdn* = 4.00) and females (*Mdn* = 3.00) since the earthquakes (at Time 2), $U = 700$, $z = -1.84$, $p = .066$, $r = .19$. Males (*Mdn* = 4.00) reported significantly higher levels of alcohol consumption than females (*Mdn* = 3.00) in the last month (at Time 3), $U = 647$, $z = -2.30$, $p = .022$, however this difference was of small magnitude, $r = .24$. Therefore, the hypothesis that males would exhibit significantly higher levels of pre-earthquake, post-earthquake and current alcohol consumption (hypothesis 2) was supported for pre-earthquake and current alcohol consumption, but not since the earthquakes.

3.4. Changes in Alcohol Consumption Over Time

The Wilcoxon Signed Ranks Test was used to compare Total Alcohol Consumption scores across the 3 time points. There was a small but significant increase in alcohol consumption from Time 1 to Time 2, $Z = -2.20$, $p = .028$, $r = .23$, supporting the hypothesis that participants would report drinking more since the earthquakes began (hypothesis 1).

Given this significant finding, changes in alcohol consumption over time were explored further. A significant decrease in alcohol consumption was found from Time 2 to Time 3, $Z = -3.88$, $p < .001$ of medium effect, $r = .41$. There was no significant difference between participants' alcohol use at Time 1 and Time 3, $Z = -1.50$, $p = .13$, $r = .16$. This change in alcohol consumption over time is presented graphically in Figure 1.

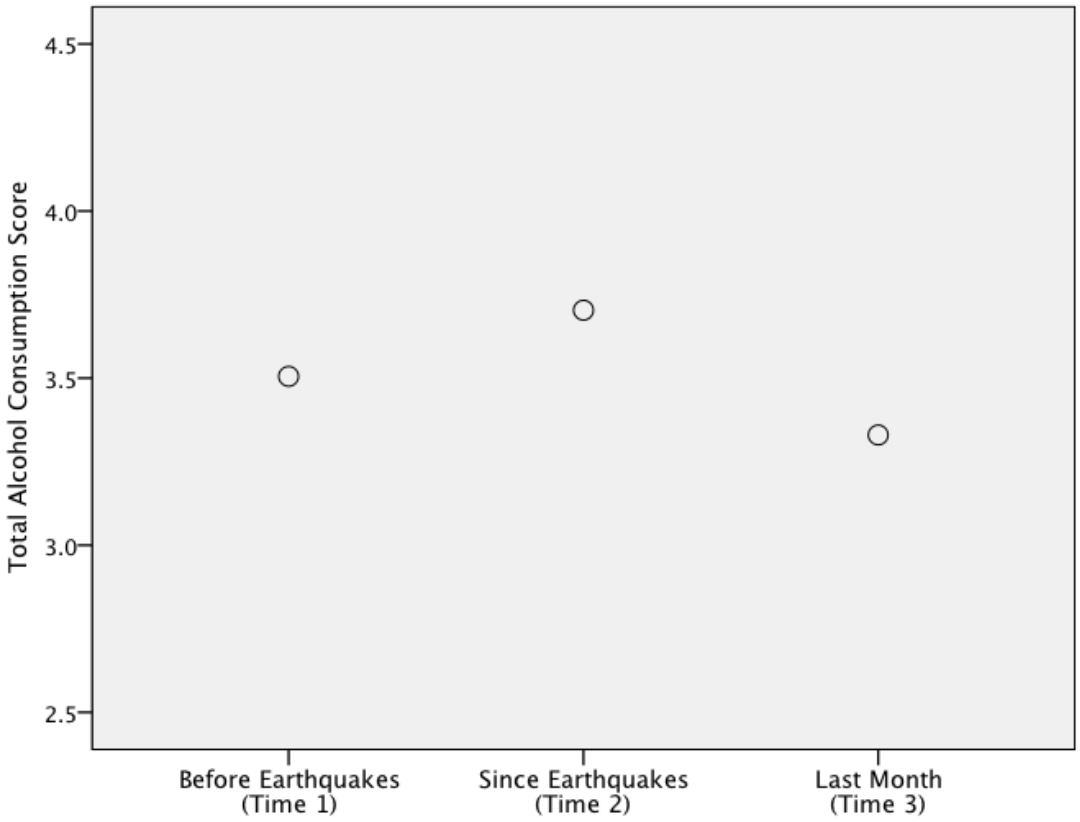

Figure 1. Mean Total Alcohol Consumption Scores for all Participants at three times, Before the Earthquakes (Time 1), Since the Earthquakes (Time 2) and In the Last Month (Time 3).

As males' and females' patterns of alcohol consumption differed substantially, the Wilcoxon Signed Ranks Test was used in order to examine changes in alcohol consumption (AUDIT-C scores) over time according to gender. These results are presented in Figure 2. Among males, there were no significant differences in alcohol consumption from Time 1 to Time 2, $Z = -.378$, $p = .705$, $r = .069$, Time 2 to Time 3, $Z = -1.19$, $p = .24$, $r = .22$ or Time 1 to Time 3, $Z = -.79$, $p = .43$, $r = .14$. Among females, significant increases in alcohol consumption were reported from Time 1 to Time 2, $Z = -2.24$, $p = .025$; this effect was of small magnitude, $r = .29$. Females reported a significant decrease in alcohol consumption from Time 2 to Time 3, $Z = -3.84$, $p = < .001$, $r = .49$, a medium effect size. There was no

significant difference in alcohol consumption from Time 1 to Time 3, $Z = -1.31$, $p = .19$, $r = .17$.

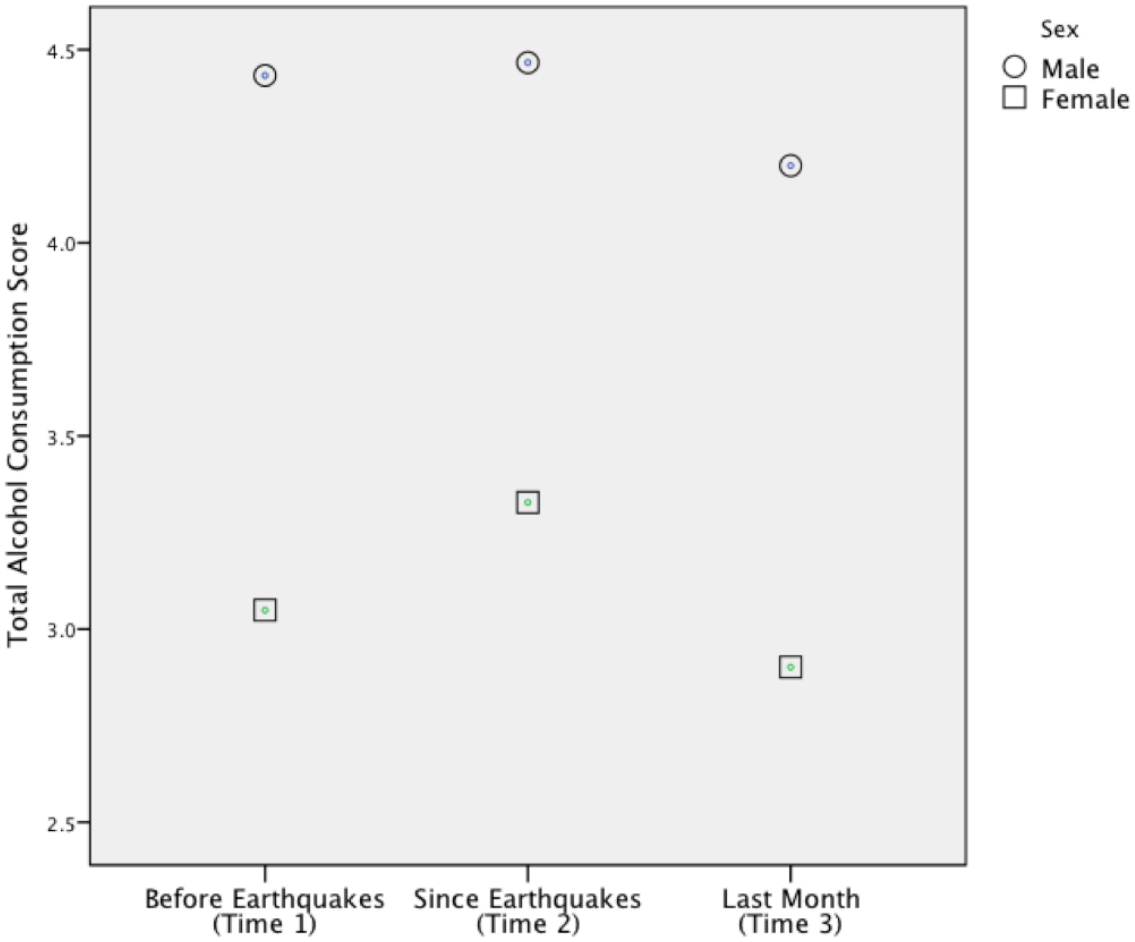

Figure 2. Mean Total Alcohol Consumption Scores for Males and Females at three times, Before the Earthquakes (Time 1), Since the Earthquakes (Time 2) and In the Last Month (Time 3).

3.5. Motives for Drinking Among the Sample

Table 5 displays the means and standard deviations of participant scores on each of the five MDMQ-R subscales in the current study, and those found by Grant et al. (2007) in two samples. In addition, the percentage of participants who endorsed at least one item per MDMQ-R subscale is presented.

Table 5

Comparisons between Modified Drinking Motives Questionnaire – Revised (MDMQ-R) Subscale Means in the Current Study, and Those Reported by Grant et al. (2007) in Two Samples

MDMQ-R Subscale	Current Study N = 91 M (SD)	% Endorsement[1]	Grant et al. (2007) Sample 1 N = 726 M (SD)	Grant et al. (2007) Sample 2 N = 603 M (SD)
Coping Motives				
Coping – Anxiety	1.81 (0.77)	78.0	1.83 (.81)	1.78 (.78)
Coping – Depression	1.21 (0.36)	45.1	1.42*** (.61)	1.36*** (.59)
Social Motives	2.93 (0.98)	94.5	2.73 (.79)	2.75 (.74)
Enhancement Motives	2.04 (0.99)	74.7	2.70*** (1.01)	2.62*** (.92)
Conformity Motives	1.19 (0.43)	28.6	1.27 (.48)	1.24 (.40)

Note. [1]"% Endorsement" represents the percentage of participants who endorsed one or more items on that subscale.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5 shows that 78.0% of participants responded with a score of two or more (1= "*never/almost never*") on one or more item of the Coping – Anxiety subscale, indicating that the majority of participants' alcohol consumption was driven by coping motives at least some of the time. Fewer participants were motivated to drink to cope with symptoms of Depression; 45.1% responded that they drank for this reason at least some of the time.

Welch's t-tests were used to compare mean MDMQ-R subscale scores obtained in the current study with those obtained by Grant et al. (2007). Mean Coping-Anxiety subscale scores were also comparable to those obtained by Grant et al. in Sample 1, $t(116) = .23$, $p = .82$ and Sample 2, $t(120) = .35$, $p = .73$. Coping – Depression subscale scores were significantly lower than those obtained by Grant et al. in both Sample 1, $t(164) = 4.77$, $p = <.001$ and Sample 2, $t(173) = 3.35$, $p = <.001$. Given these mixed findings, the hypothesis that participants would report anxiety- and depression-based coping motives for drinking at levels comparable to those found by other researchers (hypothesis 3) was only partially supported.

Table 5 also shows that 94.5% of participants endorsed one or more items of the MDMQ-R Social subscale, indicating that most participants' alcohol consumption was driven by social motives at least some of the time. Participants' scores on the Social subscale were not statistically different from those obtained by Grant et al. (2007) in Sample 1, $t(105) = 1.87$, $p = .064$, or Sample 2, $t(106) = 1.68$, $p = .10$. Similarly, 74.7% of participants endorsed one or more item on the Enhancement subscale. Enhancement subscale scores in the current study were significantly lower than those obtained by Grant et al. in both Sample 1, $t(115) = 5.98$, $p = <.001$, and Sample 2, $t(115) = 5.26$, $p <.001$. A minority of participants reported Conformity motives for their alcohol consumption; 28.6% endorsed one or more items on this subscale. Mean scores on the Conformity subscale were not statistically different from

those reported by Grant et al. (2007) in Sample 1 $t(120) = 1.65$, $p = .10$ and Sample 2 $t(115) = 1.04$, $p = .30$.

In order to determine whether differences in motives for alcohol consumption existed between males and females, the sample was divided by gender. Mann-Whitney U Tests conducted for the four non-normally distributed MDMQ-R subscales and a student's t-test conducted for the normally distributed Social subscale. There were no significant gender differences in endorsement of any of the MDMQ-R subscales.

3.6. Assessment of Traumatic Exposure Severity and Psychological Resilience

Table 6 displays means, standard deviations and ranges of participant scores on the Traumatic Exposure Severity Scale and the Connor-Davidson Resilience Scale.

Table 6

Descriptive Statistics for the Traumatic Exposure Severity Scale (TESS) and the Connor-Davidson Resilience Scale (CD-RISC) for the Total Sample.

Measure	M (SD)	Range
TESS		
Occurrence Scale	4.99 (2.39)	0-10
Distress Scale	14.87 (9.89)	0-41
Resilience	75.69 (11.97)	33-99

Note. TESS = Traumatic Exposure Severity Scale.
Resilience = Total Connor-Davidson Resilience Scale (CD-RISC) score.

Welch's t-tests were used to compare mean TESS subscale and CD-RISC scores obtained in the current study with those obtained by other researchers. The mean number of

earthquake-related events experienced in the current sample was 4.99 (SD = 2.39); this level of traumatic exposure is significantly lower than that reported by Elal and Slade (2005) in their sample of earthquake-exposed individuals (M = 11.93, SD = 3.94), $t(205) = 22.22$, p = <.001. The distress associated with these events was also significantly lower in the current sample (M = 14.87, SD = 9.89) than in Elal and Slade's sample (M = 50.13, SD = 20.11), $t(267) = 25.05$, p = <.001.

Participants' mean Connor-Davidson Resilience Scale (CD-RISC) score was 75.69 (SD = 11.97); this was significantly lower than values reported by other researchers among the general population (M = 80.4, SD = 12.8), $t(125) = 3.46$, p = <.001, and significantly higher than those obtained by a community sample of individuals who had experienced an earthquake in Turkey (M = 70.06, SD = 14.1), $t(188) = 3.65$, p = <.001 (Connor & Davidson, 2003; Karairmak, 2010). The mean CD-RISC score found in the current study was also significantly higher than values for individuals diagnosed with posttraumatic stress disorder after exposure to any kind of traumatic event (M = 47.8, SD = 19.5), $t(25) = 6.42$, p = <.001, and among war veterans (M = 30.5, SD = 6.63), $t(95) = 35.56$, p = <.001, including some individuals with posttraumatic stress disorder and other psychiatric disorders (Connor & Davidson, 2003; Green, Beckham, Youssef & Elbogen, 2014). Thus, resilience levels in the current sample exceeded those found in trauma-exposed community samples such as earthquake and war survivors, suggesting that the inclusion criteria used in the current study was successful in recruiting psychologically resilient individuals.

3.7. Correlational Analyses

Spearman rank order correlation coefficients for measures of total alcohol consumption across the three time points, level of exposure to earthquake-related trauma, drinking motives and psychological resilience are presented in Table 7.

Table 7

Bivariate Correlations Between the Alcohol Use Disorders Identification Test – Consumption (AUDIT-C), Modified Drinking Motives Questionnaire – Revised (MDMQ-R), Traumatic Exposure Severity Scale (TESS) and the Connor-Davidson Resilience Scale (CD-RISC)

Measure	Bivariate Correlations										
	1	2	3	4	5	6	7	8	9	10	11
1. Total Alc. Cons. (T1)	-	.913***	.867***	.087	.049	.326**	.450***	.377***	.556***	.076	-.010
2. Total Alc. Cons. (T2)		-	.917***	.005	-.021	.373***	.452***	.385***	.588***	.111	-.090
3. Total Alc. Cons. (T3)			-	-.039	-.063	.404***	.384***	.342**	.492***	.026	-.041
4. TESS: Occurrence				-	.907***	.073	.035	-.015	-.082	.025	.089
5. TESS: Distress					-	.107	.077	-.002	-.071	.087	.082
6. MDMQ-R: Social						-	.538***	.318**	.554***	.312**	.046
7. MDMQ-R Cop-Anx.							-	.547***	.814***	.242*	-.159
8. MDMQ-R: Cop-Dep.								-	.558***	.177	-.210*
9. MDMQ-R: Enhancement									-	.251*	-.186
10. MDMQ-R: Conformity										-	-.234*
11. Resilience											-

Note. Total Alc. Cons. = Total Alcohol Consumption score. T1 = Time 1 (Before the Earthquakes); T2 = Time 2 (Since the Earthquakes); T3 = Time 3 (In the Last Month).
TESS = Traumatic Exposure Severity Scale.
MDMQ-R = Modified Drinking Motives Questionnaire – Revised. MDMQ-R: Cop-Anx = MDMQ-R Coping – Anxiety subscale; MDMQ-R: Cop-Dep = MDMQ-R Coping – Depression subscale.
Resilience = Total Connor-Davidson Resilience Scale (CD-RISC) score.
* $p < .05$ (2-tailed). ** $p < .01$ (2-tailed). *** $p < .001$ (2-tailed).

3.7.1. Relations between traumatic exposure, alcohol consumption and motives for drinking

Table 7 shows that contrary to expectations stated in hypothesis 4, no significant correlations were found between the level of exposure to earthquake-related trauma experienced by participants (TESS Occurrence subscale) and their total alcohol consumption at any of the three time points (the AUDIT-C at Times 1, 2 and 3). Similarly, distress associated with exposure to earthquake-related trauma (TESS Distress subscale) did not correlate significantly with alcohol consumption at any of the three time points. Neither level of exposure to earthquake-related trauma nor associated distress was associated with motives for drinking (MDMQ-R subscales).

3.7.2. Relations between alcohol consumption and motives for drinking

As can be seen in Table 7, participants' alcohol consumption in the last month (AUDIT-C; Time 3) correlated significantly with four of the five MDMQ-R subscales. As hypothesised (hypothesis 5), current alcohol consumption was moderately positively correlated with Coping – Anxiety motives for drinking, $r_s(89) = .38$, $p = < .001$, and Coping – Depression motives for drinking, $r_s(89) = .34$, $p < .01$.

The association between alcohol consumption and other motives for drinking was also explored. Current (last month) alcohol consumption was moderately positively correlated with Social motives for drinking, $r_s(89) = .40$, $p = < .001$ and Enhancement motives, $r_s(89) = .49$, $p = < .001$, but not with Conformity motives $r_s(89) = .026$, $p = .81$.

3.7.3. Relations between psychological resilience, alcohol consumption and motives for drinking

Table 7 shows that psychological resilience (measured by the CD-RISC) was not significantly correlated with total alcohol consumption at any of the three time points (the

AUDIT-C at Times 1, 2 and 3). Weak negative associations were found between psychological resilience and the Coping – Depression subscale of the MDMQ-R, $r_s(88) = -.21$, $p = .047$, and between psychological resilience and the Conformity subscale of the MDMQ-R, $r_s(88) = -.23$, $p = .027$.

CHAPTER FOUR

4. DISCUSSION

Past research has studied psychopathological outcomes of exposure to mass traumas, however little is known about positive psychological adjustment in response to ongoing natural disasters and how this relates to alcohol use behaviours. The current study aimed to examine alcohol consumption and motivations for drinking among a sample of psychologically resilient individuals who had been exposed to the Canterbury earthquake sequence. Past research has largely focussed on the effects of mass trauma on subsequent alcohol use disorders. The current study departed from this by examining whether patterns of alcohol consumption below problematic levels had changed since participants were exposed to the earthquakes, and how this related to psychological resilience. The current study also examined participants' motivations for drinking. Specifically, it was explored whether psychologically resilient individuals reported drinking to cope with negative affective states, and how coping-based motives for drinking related to alcohol consumption.

Sampling strategies designed to ensure participants were psychologically resilient included excluding those who had developed psychopathology or significant symptom levels in response to the earthquakes, and by screening for self-reports of subjective wellbeing, as recommended by Fletcher and Sarkar (2013) and Bonanno (2004). Study aims were implemented by completing semi-structured and structured interviews with participants, as well as administering questionnaires measuring participants' level of traumatic exposure, degree of psychological resilience, motives for drinking, and alcohol consumption at three time points - before the earthquakes, since the earthquakes and in the last month.

4.1. Summary of Findings

Results from the current study provided support for the hypothesis that participants would report drinking more alcohol since the onset of the earthquakes (hypothesis 1). There was a significant increase in self-reported alcohol consumption since the earthquakes began. Furthermore, a significant decrease in alcohol consumption back to pre-earthquake levels was found when comparing post-earthquake alcohol consumption to current consumption. When the sample was divided by gender, it was found that this pattern was true for females only; males exhibited no significant changes in alcohol use over time. Males did, however, report significantly higher levels of pre-earthquake and current alcohol consumption compared with those reported by females, but no significant difference in alcohol consumption was found since the earthquakes. Thus, hypothesis 2, that such gender differences would be found at all three time points, was only partially supported.

It was also hypothesised that participants would report anxiety- and depression-based coping motives for drinking, at levels comparable to, or exceeding those, found by other researchers (hypothesis 3). Participants reported similar levels of anxiety-based coping motives, but lower depression-based coping motives for drinking, partially supporting this hypothesis. Nonetheless, the majority of participants (78%) reported drinking to cope with feelings of anxiety at least some of the time, and nearly half (45%) of participants were motivated to drink to cope with symptoms of depression, revealing that coping motives for drinking are highly prevalent even among a sample of psychologically resilient individuals.

Other motives for drinking among resilient, earthquake-exposed individuals were also explored. Almost all (95%) participants indicated that their alcohol consumption was driven by social motives at least some of the time; this was consistent with values reported by Grant et al (2007). Similarly, most (75%) participants reported enhancement motives for drinking, however this was below levels reported by in Grant et al.'s study. A minority (29%) of

participants reported conformity motives for their alcohol consumption; this is consistent with prior research. Motives for drinking between genders were explored, and no significant differences were found.

As expected, current alcohol consumption was moderately positively correlated with both anxiety- and depression-based coping motives for drinking (hypothesis 5). These findings show that those who are more likely to endorse coping-based motivations for drinking exhibit higher levels of alcohol consumption post-earthquake than those who are less likely to drink to cope with symptoms of anxiety or depression. Interestingly, current alcohol consumption was also moderately positively correlated with social motives and enhancement motives for drinking.

Hypothesis 4 related to the level of traumatic exposure experienced by participants. It was expected that current alcohol use and coping motives for drinking would be positively related to participants' level of traumatic exposure severity; contrary to expectations, no such associations were found.

In addition to these hypotheses, the relationships between psychological resilience and alcohol consumption, and psychological resilience and drinking motives, were explored. Psychological resilience was not significantly associated with alcohol use, however a weak negative association was found with depression-based coping motives for drinking.

4.2. Interpretations and Implications of the Current Study

The New Zealand Alcohol and Drug Use Survey found that 61% of past-year drinkers consume alcohol at least once per week (Ministry of Health, 2009). The current study found that among a resilient sample of individuals exposed to the Canterbury earthquakes, 55% reported drinking alcohol at least twice per week and 84.7% reported drinking alcohol at least fortnightly. Although the majority (76.9%) of participants in the current study reported that

they typically drank 1-2 alcoholic beverages on the days they consumed alcohol, 37.4% had engaged in binge drinking behaviour (defined as consuming six or more drinks on one occasion) since the earthquakes, with 6.6% of participants doing so on a weekly basis. The New Zealand Alcohol and Drug Use Survey reported a higher 12-month binge drinking prevalence of 61.6%, with 12.6% of survey respondents engaging in binge drinking at least once per week. While the results from the current study are not directly comparable to the New Zealand Alcohol and Drug Use Survey statistics, they do suggest that earthquake-exposed resilient individuals regularly exceed moderate consumption guidelines (Gunzerath, Faden, Zakhari & Warren, 2004).

Past research has found that individual responses to natural disasters are heterogeneous and relate to a range of psychological, demographic and event-specific factors. The psychological and behavioural response trajectories of those who exhibit positive psychological adaptation to adverse life events, particularly ongoing adversity, is an emerging area of research, in need of further investigation. Increased alcohol use and coping motives for drinking are often observed in those who witness natural disasters and other types of potentially traumatic events, particularly as the severity of traumatic exposure increases (Boscarino, Adams & Galea, 2006; Cerda, Tracy & Galea, 2011; Woersching & Snyder, 2004). The findings of the current study are consistent with other post-trauma research in the way participants in the current study reported drinking significantly more since the earthquakes began, and the majority reported drinking to cope with feelings of anxiety or depression at least some of the time. Interestingly, participants also reported subsequent reductions in alcohol use, equal to pre-earthquake levels of use, suggesting that resilient individuals' changes in alcohol use post-disaster were of a temporary nature. Such a responsive change in behaviour followed by a return to baseline over time is consistent with the accommodation effect. Participants in the current study may have accommodated to the

ongoing earthquakes and aftershocks over time as they learned to adapt to these events, resulting in a return to their earlier pre-earthquake alcohol consumption following a period of increased use. This pattern of results may mirror participants' psychological resilience, which in turn may explain why they were able to accommodate to ongoing stress, rather than experiencing it in a cumulative manner.

Moderate alcohol consumption has been related to some psychological benefits such as reducing stress levels and enhancing positive affect and social functioning (Conrod, Peterson & Pihl, 2001; Peele & Brodsky, 2000; Wilkie & Stewart, 2005). On the other hand, alcohol has dependence-producing characteristics and studies have identified moderate drinking as a risk factor for later alcohol abuse and drinking-related problems (Gunzerath, Faden, Zakhari & Warren, 2004; WHO, 2004; WHO, 2007). This raises the question of whether transient increases in alcohol use, as found in the current study, should be considered a cause for concern. Alcohol use returned to pre-earthquake levels two to three years after the onset of the earthquakes, and as such, resilient individuals in the current study are unlikely to be at increased risk for long-term negative alcohol-related physical and psychological outcomes as a result of their transient and relatively minor increase in use (Gunzerath, Faden, Zakhari & Warren, 2004; WHO, 2007). However, there was a substantial period of time during which participants may have modelled increased alcohol use behaviours to others. In Social Learning Theory, "*modelling*" is described as a form of social learning whereby individuals' actions are guided by the observation of other people's attitudes, behaviours and associated consequences (Bandura, 1977). Responsive changes in alcohol use post-earthquake, even if temporary, may have inter-generational implications for children who witnessed their parents or other family members doing so. Research has found that as parental modelling of alcohol use increases, so too does the risk of offspring alcohol use and abuse later in life (Abar, Turrisi & Mallett, 2013; White, Johnson & Buyske, 2000). In

addition, adolescents whose siblings use substances in response to stressful life events are more likely to report coping motives for alcohol use themselves (Windle, 2000). Thus, children and siblings of current study participants may have learned to incorporate the use of alcohol into their repertoire of coping mechanisms for future stressful life events. Furthermore, maternal and paternal modelling of alcohol use may have differential effects on offspring drinking behaviour. Abar, Abar and Turrisi (2009) reported that, compared to males of the same age, female adolescents whose mothers modelled alcohol use were at increased risk of negative alcohol-related consequences, such as engaging in risky behaviours and legal and interpersonal problems. Similarly, White, Johnson and Buyske (2000) reported that maternal modelling of alcohol consumption had a greater impact on offspring drinking behaviours (both male and female) than paternal alcohol consumption. Given the relatively greater impact of maternal modelling of alcohol use on offspring use later in life, the finding that females (but not males) increased their alcohol use post-earthquake in the current study underscores the potentially hazardous inter-generational effects of transient increases in alcohol use. This has implications for the delivery of community-wide intervention post-disaster locally as well as internationally. It may be important to increase public awareness of the possible negative implications of using more alcohol as a coping strategy after experiencing a natural disaster, particularly with regard to the effects of modelling such behaviour to others.

Contrary to expectations, participants' alcohol consumption was not associated with the severity of their traumatic exposure; this is in contrast to findings reported by prior studies (Boscarino, Adams & Galea, 2006; Cerda, Tracy & Galea, 2011). These equivocal research findings are likely to relate to the differences in the samples; Boscarino, Adams and Galea (2006) included individuals who had developed posttraumatic stress disorder and alcohol use disorders. This is likely to have resulted in greater associations between traumatic

exposure severity and alcohol use, given that those who develop posttraumatic stress disorder are more likely to misuse alcohol post-trauma and experience higher levels of exposure to trauma (Altindag, Ozen & Sir, 2005; Başoğlu, Şalcioğlu & Livanou, 2002; Lai, Chang, Connor, Lee & Davidson, 2004; Sharan, Chaudhar, Kavethekar & Saxena, 1996). The current study was unique in that it examined alcohol use among a sample of psychologically resilient individuals without alcohol use disorders, which may partly explain the incongruity with prior research. Furthermore, participants' mean level of traumatic exposure was significantly lower in the current study than that found in a community sample of individuals who had also experienced an earthquake in Turkey (Elal & Slade, 2005). While this may reflect a true difference in the severity of traumatic exposure experienced by participants in the current study, an alternative explanation pertains to potential cultural differences in the reporting of such exposure. The New Zealand culture of downplaying ones successes and achievements to avoid social ostracism (Mouly & Sankaran, 2002) may translate to increased humility in reporting ones struggles after difficult life events. Many resilient participants in the current study reported feeling "lucky" about the extent to which they were affected by the earthquakes compared to others, despite being recruited partly based on their relatively high levels of exposure to the earthquakes and their effects. Those who experienced the Canterbury earthquakes have been continuously presented with severely exposed individuals' experiences of the same events through conversation and media coverage, perhaps making them more likely to perceive their own experiences as relatively minor. Furthermore, the absence of association between alcohol use and traumatic exposure in the current study is also likely related to the lower variability in level of traumatic exposure experienced by participants.

The negative association between psychological resilience and coping-based motives for drinking reported in the current study warrants further investigation. Findings from the

current study suggest that those who have a lower capacity to positively adapt to or recover from a traumatic experience do not differ in terms of their level of alcohol use, but they are more likely to consume alcohol to cope with negative affective states following exposure to a mass trauma than those who exhibit higher levels of psychological resilience. An inverse relationship between psychological adjustment and coping motives for alcohol use has been reported in previous studies; coping motives for drinking have been associated with psychopathology, negative alcohol-related outcomes and problematic patterns of alcohol consumption post-trauma (Olff, Langeland & Gersons, 2005; Stappenbeck, Bedard-Gilligan, Lee & Kaysen, 2013). This is an interesting finding, however, given that all participants in the current study met criteria for psychological resilience and alcohol use did not reach problematic levels. It is noteworthy that even among a sample of resilient individuals, which by definition signifies a capacity to positively adapt to stress, alcohol was used as a coping mechanism for negative affect, up to three years after the onset of the earthquakes. While this may suggest that using alcohol was a successful coping strategy for resilient participants in the current study, attributing meaning to ones alcohol use is complex. It is possible that those who experience a mass trauma are biased towards attributing their alcohol use to coping with this event. Actor-observer asymmetry is an effect described in attribution theory, in which people believed to be biased towards attributing others' behaviour to stable, internal characteristics, and their own behaviour to external, situationally bound causes, particularly when the outcomes of behaviour are negative (Jones & Nisbet, 1971). The actor-observer effect may have played a role in the way participants attributed reasons to their alcohol consumption in the current study. Participants may have been more likely to attribute their drinking to external causes (such as coping with the earthquakes or social reinforcement gained from drinking), particularly if they perceived their alcohol use as negative. However, it is important to note that reported levels of coping motives in the current sample did not

exceed normative levels, as found by other researchers among individuals who had not been exposed to a potentially traumatic event (Grant, Stewart, O'Connor, Blackwell & Conrod, 2007). Given that participants also reported increased alcohol use since the earthquakes, this would raise the question of whether participants reported drinking to cope because they were drinking more since the earthquakes, or whether they were drinking more alcohol because they were using it to cope with their experiences. These are both plausible possibilities in need of clarification in further studies.

Regardless of the underlying processes of coping-based alcohol use, the finding that psychologically resilient individuals reported drinking to cope with negative internal states in the current study has implications for community-wide responses to mass trauma. While resilient individuals may not require psychological intervention to reduce psychological distress post-trauma (Bonanno, 2004), providing individuals exposed to natural disasters with alternative, more adaptive coping strategies may further enhance positive psychological adaptation in this group (Davidson et al., 2005; Green, Beckham, Youssef & Elbogen, 2014).

The current study extended existing research by examining gender differences in alcohol use over the course of ongoing earthquakes and aftershocks. Previous studies have found that males consistently report drinking more alcohol (both frequency and quantity) than females (Kerr-Correa, Igami, Hiroce & Tucci, 2007; Ministry of Health, 2009; Nolen-Hoeksema, 2004). Overall, findings from the current study concur with such a gender difference among resilient individuals. However, it was found that only females changed their alcohol consumption habits over time. The relatively small number of males who participated in the current study (n = 30) may have obscured a pattern of increased alcohol consumption among this group. Alternatively, there may have been genuine differences in resilient males' and females' alcohol consumption in response to the earthquakes. A review of gender differences in response to natural disasters found a higher representation of men than women

in formal emergency management roles and external emergency response work, such as search and rescue (Fothergill, 1998). Conversely, females tend to be responsible for social and domestic tasks compatible with traditional gender roles, such as childcare, preparing family members for evacuation, caring for vulnerable or elderly members of the community, organising food supplies and preparing the household, and volunteering in community disaster relief groups (Fothergill, 1998; WHO, 2002). It is likely that socially driven gender roles may have contributed to Canterbury residents' behavioural responses to the earthquakes in the same way, and in line with Fothergill's (1998) findings, many participants in the current study noted during the semi-structured interviews that there were increases in social opportunities and community cohesion post-disaster. For example, accommodating displaced family members and friends in ones home was a common occurrence in Canterbury following the earthquakes, and caring for these guests is a responsibility more likely to have been assumed by women. Therefore, consuming alcohol in social settings may have been an important factor underlying current study participants' increased alcohol use after the earthquakes, particularly among females. As daily life became more sociable for those who supported family and friends after the earthquakes, those who experience positively reinforcing effects of alcohol consumption in social settings may have increased their drinking not to cope with negative affect, but due to increased socialisation. The findings that 95% of participants in the current study (97% of females and 90% of males) reported drinking for social reasons at least some of the time, and social motives for drinking were positively correlated with alcohol consumption, are in accordance with this line of reasoning.

4.3. Strengths and Limitations of the Current Study

Methodological limitations of the current study are as follows. The resilient nature of the sample and the snowball sampling method used limit the extent to which findings from the

current study can be generalised to the general population. However, given that the current study aimed to examine alcohol consumption among a specific subset of the Canterbury community (resilient individuals), the sample was not selected to represent the general population. Furthermore, the sample was truncated by degree of exposure to the earthquakes and earthquake-related events, and those who met criteria for alcohol use disorders were also excluded. Thus, in spite of substantial inter-individual variation in levels of exposure, the sample was relatively homogenous, which arguably limits finding generalisability to the resilient population as a whole.

Moreover, self-report questionnaire data are open to social desirability biases. Although some studies have reported that impression management or socially desirable responding can lead to underreporting of alcohol use and misuse (Davis, Thake & Vilhena, 2010), self-report measures of alcohol consumption tend to be reliable and valid (Del Boca & Darkes, 2003).

It is possible that asking participants to retrospectively provide information about their alcohol use before and since the earthquakes resulted in biased information. Between two and three years had lapsed since the onset of the earthquake sequence in September 2010; thus, participants may have inadvertently provided inaccurate information due to errors in temporal recall. However, using a landmark event (such as an earthquake) as a temporal anchor increases accurate recall of the frequency and occurrence of other events in relation to this landmark (Gaskell, Wright & O'Muircheartaigh, 2000). Furthermore, retrospective reporting was unavoidable in the current study, given that the earthquakes were unexpected and unpredictable. However, ideally alcohol use would have been measured at the time points considered in the current study (before the earthquakes, since the earthquakes and in the last month) in order to track changes across time. Moreover, measuring motives for drinking at these three time points may also have elucidated the gender differences in alcohol consumption over time found in the current study. Males and females may have used alcohol

differently due to underlying motivational differences, such as higher levels of social motives among women who experienced increases in socialisation as a result of the earthquakes. Resilience would also ideally have been assessed at several time points to ensure participant stability of healthy functioning across time, as recommended by Bonanno (2012).

In addition, the correlational and observational design of the study made it impossible to establish causation among the variables examined. While it is likely that participants' motives for drinking affected how much alcohol they consumed; it is also possible that participants' level of alcohol use influenced how they attributed meaning to their drinking. Similarly, higher levels of psychological resilience may have resulted in a decreased reliance on alcohol to cope with symptoms of depression, or using alcohol to cope with symptoms of depression may negatively impact resilience. It is also possible that additional variables not considered in the current study underlie the associations that were found, such as attribution styles. This is a common difficulty in trauma research, as prospective designs are seldom achievable or ethically appropriate.

A major strength of the current study is the extension of prior research on psychological resilience, as the investigation of cognitive and behavioural responses of those who are able to adapt to mass trauma in a positive way is relatively under-researched. The current study has contributed to our understanding of psychological resilience in populations exposed to natural disasters by investigating how resilience relates to alcohol use and motives for drinking after an earthquake. Broadening the scientific knowledge base in this area is necessary for advancing the development of interventions designed to promote resilience among those at risk of negative outcomes following adversity, including cognitive-behavioural approaches which have yielded promising results (Ahmed, 2007; Davidson et al., 2005; Green, Beckham, Youssef & Elbogen, 2014). In addition, the conceptualisation of resilience in the current study was in accordance with recommendations stated in thorough

reviews of research on resilience (Fletcher & Sarkar, 2013; Luthar, Cicchetti & Becker, 2000). Sound operationalisation of resilience, combined with the use of standardised, psychometrically sound measures increases the validity of the findings obtained in the current study.

4.4. Future Research Considerations

Future prospective research is required to elucidate motivations for drinking immediately after a natural disaster as well as after an extended follow-up period, as it is likely that motivations for drinking change over time as the length of time since exposure, and corresponding environmental factors such as property and infrastructure reconstruction, increases. A prospective study design would address this possibility, and would clarify whether transient changes in alcohol use in response to ongoing adversity, particularly among those who drink to cope, are associated with psychological accommodation processes by examining psychological adjustment in relation to alcohol use over time. A longitudinal study would also provide the opportunity to assess psychological resilience at several time points over the course of such a natural disaster series. This would further understanding of the resilience trajectory in response to ongoing stressors, and enable more objective measurement of stable levels of adaptive functioning across time. Prospective research investigating the mechanisms underlying the relations between motives for drinking and level of alcohol use would yield more conclusive results regarding the direction of this association.

Increased opportunities for social interaction and cohesion as a result of the earthquakes were noted by many participants during the semi-structured interviews, which may have been causally linked to typical post-disaster responses and responsibilities assumed by males and females at this time. Given that increased socialisation may be associated with the temporary

increase in alcohol consumption found in the current study, particularly among females, it would be valuable to investigate this possibility more directly and systematically.

Measures of traumatic exposure such as Traumatic Exposure Severity Scale should also be validated for use among New Zealand populations to confirm whether they accurately represent severity of exposure in this culture, where ones successes and struggles are often downplayed.

4.5. Conclusions

The Canterbury earthquake sequence has provided a unique opportunity to examine and understand psychological and behavioural responses to an ongoing natural disaster, and how such responses might be related to psychological resilience. The current study was able to gain a valuable preliminary insight into the characteristics and behaviours of a sample of resilient individuals who endured thousands of earthquakes and aftershocks, yet managed to maintain psychological stability and adapt positively to these adverse events. The current study examined how a sample of resilient individuals' patterns of drinking changed since the earthquake sequence began in September 2010, and why they were consuming alcohol. Resilient individuals reported drinking more since the earthquakes began, however this increase was transient and reported by females only. Coping motives for alcohol consumption were reported by a majority of the sample, and a considerable proportion of the sample exceeded moderate alcohol consumption recommendations regularly up to three years after the first earthquake. These findings are of consequence not only for individuals' own wellbeing, but also for the younger generation who have witnessed the use of alcohol as a coping strategy for stressful life events.

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APPENDIX A

Understanding response to earthquakes: promoting recovery and building resilience

We are seeking volunteers for a study on the effects of the Canterbury earthquakes.

We are interested in including in our study people who have had loss or hardship as a result of the earthquakes (such as loss or difficulties at work or home, death or injury of family or friend), or who witnessed the effects of the earthquakes, such as being in the city centre and seeing fallen buildings or injured people, yet have felt able to cope with these events and effects. The study will involve assessment of psychological responses, verbal memory and emotional processing, and measurement of stress hormones and heart rate variability.

We are interested in how these and other factors such as past mental health and severity of exposure to the earthquakes or difficulties as a result of the earthquakes may relate to the severity of psychological responses after a major event such as the earthquakes.

In addition we will also be studying a group of people who require treatment for very significant earthquake-related distress.

If you are interested in being involved in this study or would like further information, please contact Alex Loughlin at the Department of Psychological Medicine, University of Otago, Christchurch on 372 0400 or email alex.loughlin@canterbury.ac.nz

APPENDIX B

EARTHQUAKE STUDY RESILIENT CONTROLS SCREENING FORM

Date: ____ / ____ / ____ Time: _____ _____

Name: _____ Age: _____ DoB: ____ / ____ / ____

Postal Address: _____

Phone No: _____ (home), _____ (work) May we leave message?.....Y / N

Cell phone: _____ Email _____

How did you hear about the study?

Via Advert ☐ Word of mouth _____ ☐ Other: *Specify* _____ ☐

How affected were you by the earthquakes (injury? What happened to you, family, close friends, injury to self/others, death of friend/family/associate? impacts on work, finances, home, land, school, transport, any other issues?)-

_____

_____

How are you coping?_____

_____

Any current symptoms?

Anxiety_____ Reexperiencing_____ Low mood_____

Hyperarousal_____ Flashbacks_____ Sleep_____

Avoidance_____ Nightmares_____ Alcohol/Substance Use_____

Psychiatric disorders?_____

Suicidality Y / N _____

Availability time for assessment: _____(Terrace House/University; during office hours)

Current psychological treatments (including ACC) currently?_____

Impression/rating of severity: Nil Mild Moderate Severe

Other information_____

_____

Appropriate for Study?: Y / N If not appropriate for study write reasons:

Exclusion Criteria:

__Declined
__Don't meet inclusion
__Meet exclusion

Checklist:
1. Recorded story about EQs
2. Structured interview mental health
3. Heart rate
4. Computer tasks of memory, facial emotion recognition
5. Measuring salivary cortisol
6. Questionnaires
7. Repeat in 6 months

IF YES: Appointment date/time: ___ / ___ / ___ _____am/pm

Assessor:_____

or other (specify)_____

(Copy to Co-ordinator and Assessor)

*If risk, raised with clinician Y / N Specify*_____

APPENDIX C

Understanding response to earthquakes: promoting recovery and building resilience

Information Sheet

University of Otago – Department of Psychological Medicine

Introduction

You are being invited to take part in a research study about psychological responses to the Canterbury earthquakes. It is important for you to understand why the research is being conducted and what it will involve. Please take time to read over this information sheet carefully and to ask us if there is anything that is not clear or if you would like more information. You are free to discuss this study with others to help you come to a decision.

What is the purpose of the study?

You will be one of a number (around 100) of people volunteering for this study of responses to the Canterbury earthquakes. In addition we will be studying 100 people who require treatment for very significant earthquake-related distress. Your psychological responses to the earthquakes will be assessed along with measures of verbal memory and emotional processing, and levels of stress hormones. We are interested in how these and other factors such as past mental health problems and severity of exposure to the earthquakes or problems as a result of the earthquakes may relate to the severity of psychological difficulties after a major event such as the earthquakes.

Who is running the study?

This study is being conducted by Drs Caroline Bell, Virginia McIntosh, Janet Carter, Martin Dorahy, Jenny Jordan, Richard Porter. These researchers are working at the University of Otago, Christchurch and Canterbury University.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are free to withdraw at any time without giving a reason. In the event that you withdraw from the study all data collected from you will be destroyed and will not be included in the study. You will receive the same treatment whether or not you decide to take part

What will happen to me if I take part?

First you will have a structured clinical interview about your psychological and mental health history and responses to the earthquakes. If you have a serious psychological problem we may ask your permission to contact your GP or refer you for treatment. If you agree to this research then you will also complete questionnaires asking about demographics (gender, age, ethnicity, education, occupation, relationship status, and the suburb you live in); severity of earthquake-related trauma exposure (such as the loss of a friend or family member, damage

to home or employment); PTSD scale (the PTSD Checklist (PCL); Work and Social Adjustment Scale; and a scale to assess alcohol use, the AUDIT.

To measure stress hormone levels, we will ask you to collect samples of your saliva (by chewing a piece of cotton wool and putting it into containers which we will supply), seven times a day over two days. We will ask you to do this before and after treatment.

You will also complete a short (approximately 30 minutes) series of computer tasks to assess how you identify certain emotions in facial expressions.

What are the risks involved in taking part in the study?
We do not foresee any risks in participation. Please ask the researcher if you have any questions before participating.

Will I receive compensation for time taken to be part of this study?
There will not be any compensation for the extra time spent on the study. However, we will pay for parking and other expenses that may be involved in these visits

Will my taking part in this study be kept confidential?
We will hold information about you on a computer in the Department of Psychological Medicine in Christchurch. Only those directly involved in the study will have access to this information and we will ensure that confidentiality is kept.

(If in the course of the research we discover information which is important to your continued health and safety, we will discuss this with you and ask your permission to convey this to your General Practitioner.)

What will happen to the results of the research?
We plan to finish the study by the end of 2013. After the study is completed we will be happy to let you know and to discuss the results of the study with you. We plan to submit the results for publication in a science journal. You can be assured of the complete confidentiality of the data gathered in this investigation; the identity of the participants will not be made public. You are welcome to request a copy of our published results when these are available.

Where can I get information about the study?
Drs Caroline Bell and Virginia McIntosh can be contacted by telephone on (03) 3720400 ext. 86430 or e mail on caroline.bell@otago.ac.nz or virginia.mcintosh@otago.ac.nz

Please keep this information sheet. Thank you for considering this proposal.

This project has been approved by the Upper South A Regional Ethics Committee

APPENDIX D

Understanding response to earthquakes: promoting recovery and building resilience

Consent Form

University of Otago – Department of Psychological Medicine

I have been invited to take part in a study investigating responses to the Canterbury earthquakes. This research is being conducted by Drs Caroline Bell, Virginia McIntosh, Jenny Jordan, Janet Carter, Martin Dorahy, Frances Carter, Helen Colhoun and Richard Porter and Mrs Dianne LeCompte.

- I have read and I understand the information sheet dated 31.05.12 and description of the above-named project. I agree to participate in the project, and I consent to publication of the results of the project with the understanding that confidentiality will be preserved.

- I have had the opportunity to discuss the project with others in order to come to a decision.

- I also understand that participation is voluntary (my choice), and I may withdraw from the project at any time. In the event that I withdraw from this study all data collected from me will be destroyed and will not be included in the study.

- I understand that part of my interview will be audio-recorded, and the recording will be transcribed for research purposes.

PARTICIPANT'S NAME: _____ DATE: _____

Signature: _____

INVESTIGATOR'S NAME: _____ DATE: _____

Signature: _____

APPENDIX E

UNIVERSITY of OTAGO
TE WHARE WĀNANGA O OTĀGO

Canterbury District Health Board
Te Poari Hauora ō Waitaha

The Christchurch School of Medicine
DEPARTMENT OF PSYCHOLOGICAL MEDICINE

Clinical Research Unit
Terrace House
4 Oxford Tce
Christchurch 8140

Phone (03) 372 0400
Fax (03) 372 0407

Understanding earthquake-related stresses

Interview guidelines

A semi-structured interview is to be conducted based on the following open questions.

Other questions may be asked to clarify responses to these questions. Prompts may be used if participants do not mention any symptoms or particular stressors.

1. **Tell me about your experience in the Canterbury earthquakes.**
   - **Which earthquake(s) were the most impactful for you?**
     - **Were you in Christchurch / Canterbury for all of the large quakes?**
   - **4 September 2010** **Yes / No**
   - **26 December (Boxing Day) 2010** **Yes / No**
   - **22 February 2011** **Yes / No**
   - **13 June 2011** **Yes / No**
   - **What kind of immediate impact did the earthquakes have on you? Since then? Most impactful aspects? (prompt re exposure, e.g. where were you? what did you experience? what did you see/hear? What happened to you, family, close friends, injury to self/others, death of friend/family/associate?)**
   - **What changes have occurred since the earthquakes (prompt re impacts on work, finances, home, land, school, transport, any other issues?)**
   - **What things have bothered you the most? Fears? Concerns? Have you noticed that you are more angry,**
2. **Before September 2010, did you have problems such as severe stress, anxiety, depression, alcohol or drug problems or any other psychological difficulties?**
3. **What kinds of things have you been doing to cope with the earthquakes and their effects?**
   - **What are the things that have helped you cope?**
   - **or have been using more alcohol or other drugs or doing others things to help you cope?**
4. **What positive effects have there been from the earthquakes?**
   - **personal strength?**
   - **different way of looking at things? New meaning?**
   - **greater connectedness to other people/neighbours? Greater sense of community?**
   - **spiritual beliefs?**
   - **appreciation of life?**
5. **Is there anything else you would like to add that we might have missed out?**

APPENDIX F

Alcohol Use Disorders Identification Test (AUDIT)

Because alcohol use can affect your health and can interfere with certain medications and treatments, it is important that we ask some questions about your use of alcohol. Your answers will remain confidential so please be honest.

Please circle the response that best describes your answer to each question.

Before the earthquakes…					
1. how often did you have a drink containing alcohol	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
2. how many drinks containing alcohol did you have on a typical day when you were drinking?	1 or 2	3 or 4	5 or 6	7, 8 or 9	10 or more
3. how often did you have six or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
Since the earthquakes…					
4. how often have you had a drink containing alcohol	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
5. how many drinks containing alcohol have you had on a typical day when you were drinking?	1 or 2	3 or 4	5 or 6	7, 8 or 9	10 or more
6. how often did you have six or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
In the last month…					
7. how often do you have a drink containing alcohol	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
8. how many drinks containing alcohol did you have on a typical day when you were drinking?	1 or 2	3 or 4	5 or 6	7, 8 or 9	10 or more
9. how often did you have six or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
10. How often have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
11. How often have you failed to do what was normally expected from you because of drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
12. How often have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
13. How often have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily

14. How often have you been unable to remember what happened the night before because you had been drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
In the last year…					
15. Have you or someone else been injured as result of your drinking?	No		Yes, but not in the last year		Yes, during the last year
16. Has a relative or friend or a doctor or another health worker been concerned about your drinking or suggested you cut down?	No		Yes, but not in the last year		Yes, during the last year

APPENDIX G

Modified Drinking Motives Questionnaire - Revised

Instructions: Here is a list of reasons people give for drinking alcohol. Thinking of all the times you drink, how often would you say that you drink for each of the following reasons? There are no right or wrong answers to these questions. If you no longer drink alcohol, please answer for when you used to drink**.**

	NEVER/ ALMOST NEVER				ALWAYS/ALMOST ALWAYS
1. As a way to celebrate	1	2	3	4	5
2. To relax	1	2	3	4	5
3. Because I like the feeling	1	2	3	4	5
4. Because it is what most of my friends do when we get together	1	2	3	4	5
5. To forget my worries	1	2	3	4	5
6. Because it is exciting	1	2	3	4	5
7. To be sociable	1	2	3	4	5
8. Because I feel more self-confident or sure of myself	1	2	3	4	5
9. To get a high	1	2	3	4	5
10. Because it is customary on special occasions	1	2	3	4	5
11. Because it helps me when I am feeling nervous	1	2	3	4	5
12. Because it's fun	1	2	3	4	5
13. Because it makes a social gathering more enjoyable	1	2	3	4	5
14. To cheer me up when I'm in a bad mood	1	2	3	4	5
15. To be liked	1	2	3	4	5
16. To numb my pain	1	2	3	4	5
17. Because it helps me when I am feeling depressed	1	2	3	4	5
18. So that others won't kid me about not drinking	1	2	3	4	5
19. To reduce my anxiety	1	2	3	4	5
20. To stop me from dwelling on things	1	2	3	4	5
21. To turn off negative thoughts about myself	1	2	3	4	5
22. To help me feel more positive about things in my life	1	2	3	4	5
23. To stop me from feeling so hopeless about the future	1	2	3	4	5
24. Because my friends pressure me to drink	1	2	3	4	5
25. To fit in with a group I like	1	2	3	4	5
26. Because it makes me feel good	1	2	3	4	5
27. To forget painful memories	1	2	3	4	5
28. So I won't feel left out	1	2	3	4	5

APPENDIX H

Traumatic Exposure Severity Scale (Modified Version)

	YES	NO	IF YES, INDICATE HOW DISTRESSING THIS WAS FOR YOU NOT AT ALL DISTRESSING				EXTREMELY DISTRESSING
1. Were you alone at the time of the earthquake?	YES	NO	1	2	3	4	5
2. Were members of your family apart at the time of the earthquake?	YES	NO	1	2	3	4	5
3. Did you have children you were responsible for under the age of fourteen?	YES	NO	1	2	3	4	5
4. Did you have to spend the night somewhere other than in your home?	YES	NO	1	2	3	4	5
5. Did you need food and water aid after the earthquake?	YES	NO	1	2	3	4	5
6. Did you need clothes aid after the earthquake?	YES	NO	1	2	3	4	5
7. Did you need shelter after the earthquake?	YES	NO	1	2	3	4	5
8. Did you suffer financial difficulties because of the earthquake?	YES	NO	1	2	3	4	5
9. Did you need financial assistance from others because of hardships caused by the earthquake?	YES	NO	1	2	3	4	5
10. Was your home damaged in the earthquake?	YES	NO	1	2	3	4	5
11. Have there been times when you have not had essential services (eg, power, water, sewerage) where you were living due to the earthquake?	YES	NO	1	2	3	4	5
12. Did you have to relocate because your house became structurally unsafe to live in?	YES	NO	1	2	3	4	5
13. Have you had frustrations dealing with insurance or EQC matters?	YES	NO	1	2	3	4	5
14. Have you had problems as a result of the zoning of your home (whether your home is in an area zoned green/orange/red/white)?	YES	NO	1	2	3	4	5
15. Have you had others living with you in your home since the earthquake?	YES	NO	1	2	3	4	5
16. Has your employment been affected since the earthquake?	YES	NO	1	2	3	4	5
17. Have you lost your job since the earthquake?	YES	NO	1	2	3	4	5
18. Has your work premises been disrupted (eg, needed to relocate, needed to share workspace) since the earthquake?	YES	NO	1	2	3	4	5
19. Have your children attended school in a different place due to their usual school being damaged in the earthquakes?	YES	NO	1	2	3	4	5
20. Have your children attended school at a different time due to their school sharing premises with another school due to earthquake damage?	YES	NO	1	2	3	4	5

21. Did you lose movable goods in the earthquake?	YES	NO	1	2	3	4	5
22. Were you physically injured in the earthquake?	YES	NO	1	2	3	4	5
23. Did you lose an organ or functioning of an organ in the earthquake?	YES	NO	1	2	3	4	5
24. Did you become dependent on others because of the physical injuries/losses you suffered?	YES	NO	1	2	3	4	5
25. Were you buried under rubble for a period of time after the earthquake?	YES	NO	1	2	3	4	5
26. Were you trapped in a building for a period of time after the earthquake?	YES	NO	1	2	3	4	5
27. Did you lose any members of your immediate family in the earthquake?	YES	NO	1	2	3	4	5
28. Were any members of your family or your loved ones physically injured in the earthquake?	YES	NO	1	2	3	4	5
29. Did any of your loved ones become dependent on you for physical care because of their injuries?	YES	NO	1	2	3	4	5
30. Was a member of your family or someone close to you trapped under rubble or in a building?	YES	NO	1	2	3	4	5
31. Was there a period when you knew your loved ones were buried under rubble or in a building but you were unable to reach them?	YES	NO	1	2	3	4	5
32. Was there a period when you were uncertain about the welfare of loved ones, when you were unable to establish contact or unable to locate them?	YES	NO	1	2	3	4	5
33. Did you lose any relatives (e.g., aunts, uncles, cousins, grandparents) in the earthquake?	YES	NO	1	2	3	4	5
34. Have any close family been distressed at having to move from their homes?	YES	NO	1	2	3	4	5
35. Did you see buildings falling down as a result of the earthquake?	YES	NO	1	2	3	4	5
36. Did you see injured people after the earthquake?	YES	NO	1	2	3	4	5
37. Were you involved in rescue work?	YES	NO	1	2	3	4	5
38. Did you see dead bodies or body parts during the rescue and clearing up work period?	YES	NO	1	2	3	4	5
39. Did you hear sounds and cries for help from individuals trapped under rubble?	YES	NO	1	2	3	4	5

APPENDIX I

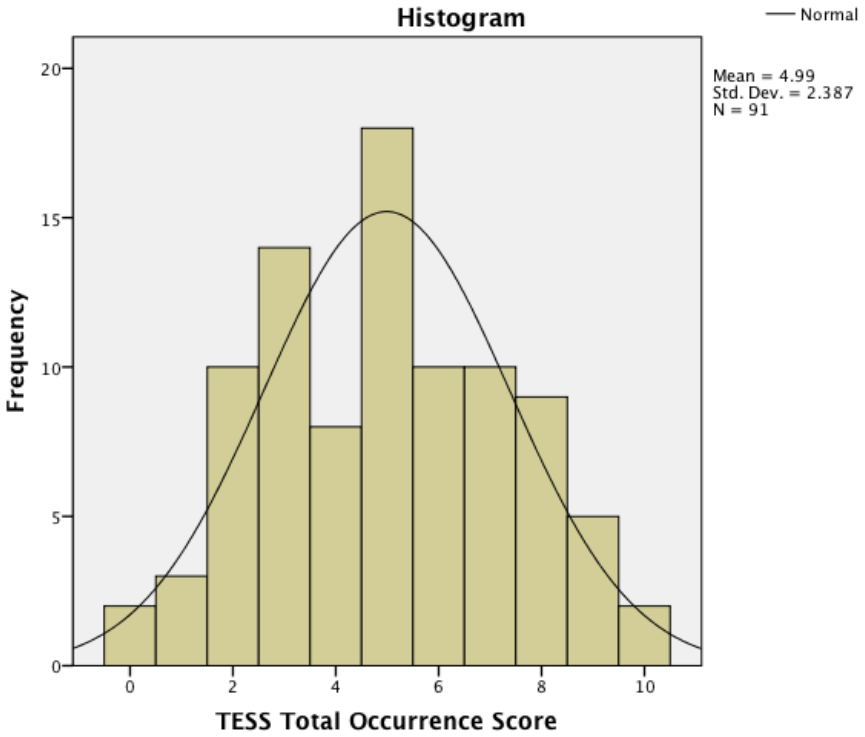

Figure I1. Distribution of the Traumatic Exposure Severity Scale – Total Occurrence Scores.

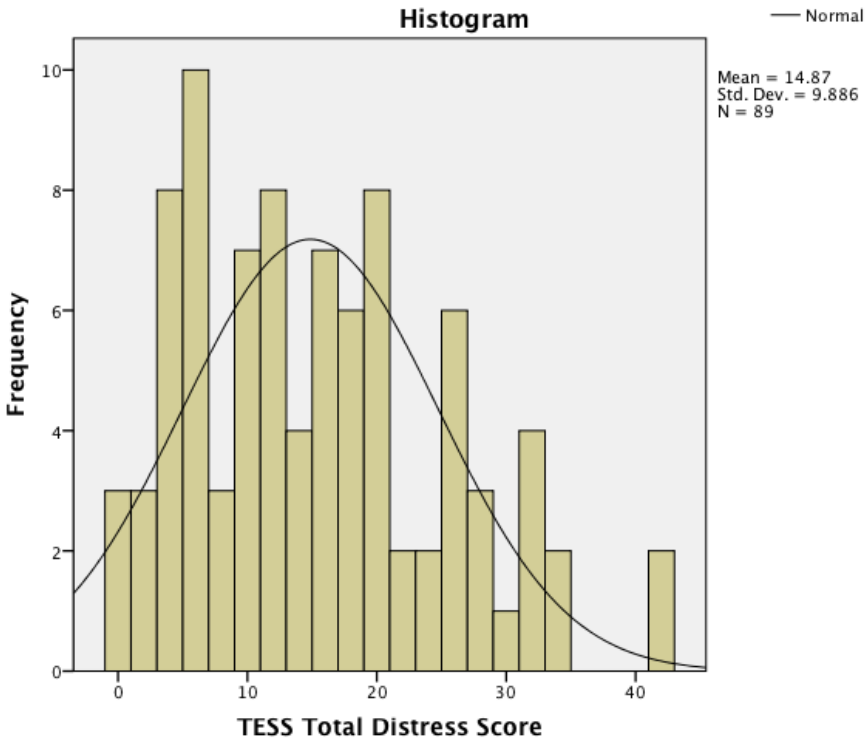

Figure I2. Distribution of the Traumatic Exposure Severity Scale – Total Distress Scores.

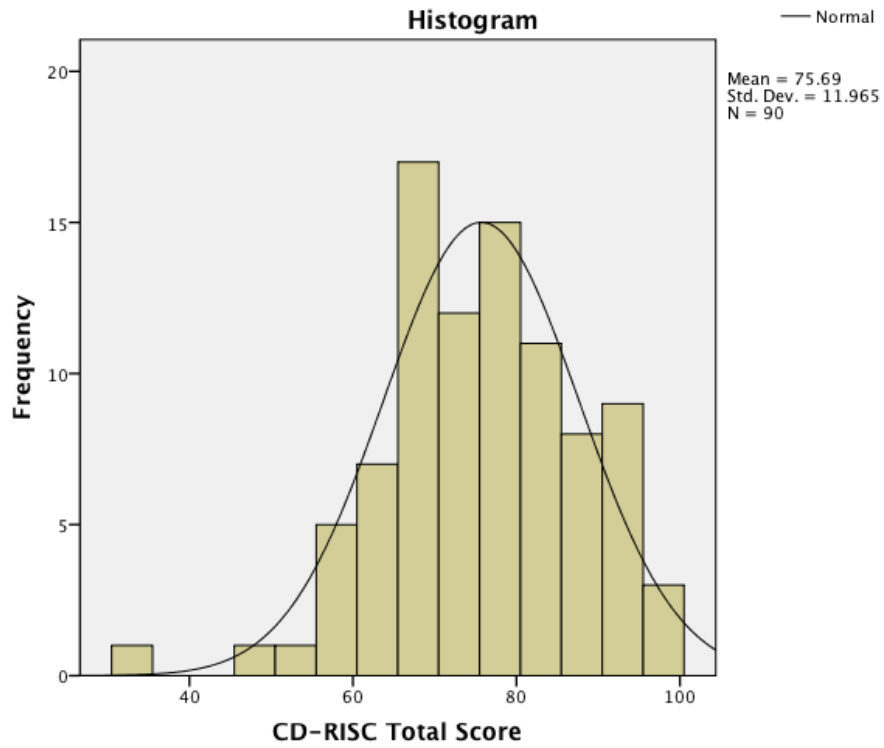

Figure I3. Distribution of the Connor-Davidson Resilience Scale Scores.

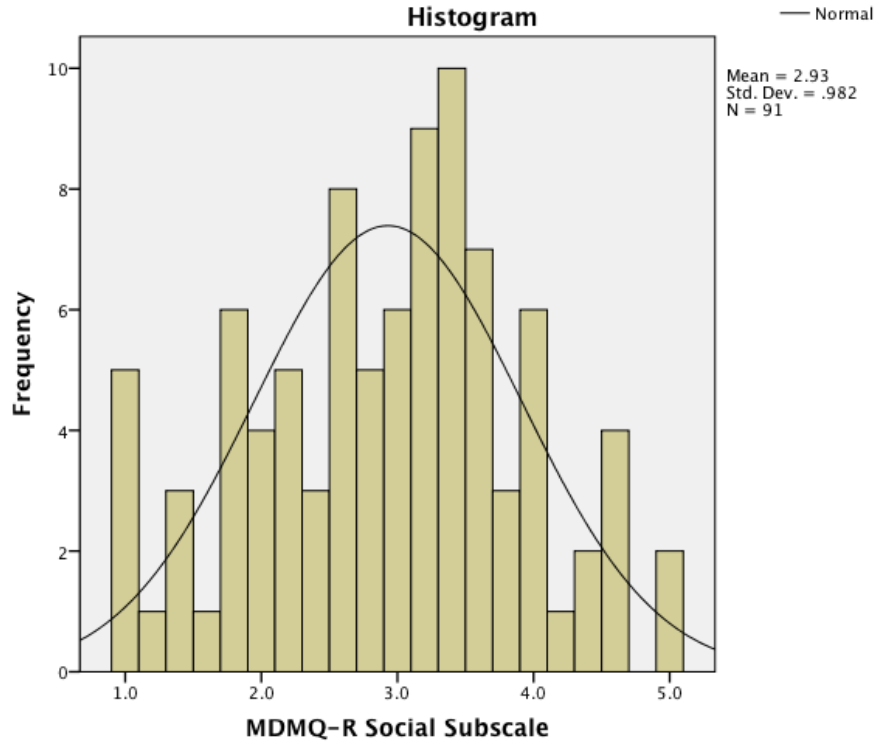

Figure I4. Distribution of Modified Drinking Motives Questionnaire – Revised: Social Subscale Scores.

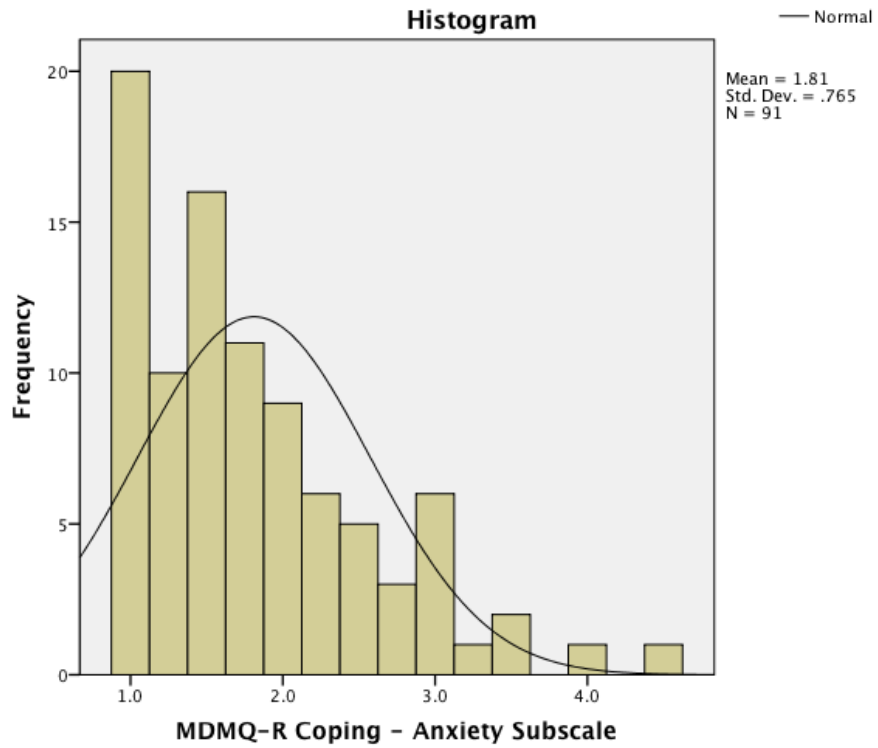

Figure I5. Distribution of Modified Drinking Motives Questionnaire – Revised: Coping – Anxiety Subscale Scores.

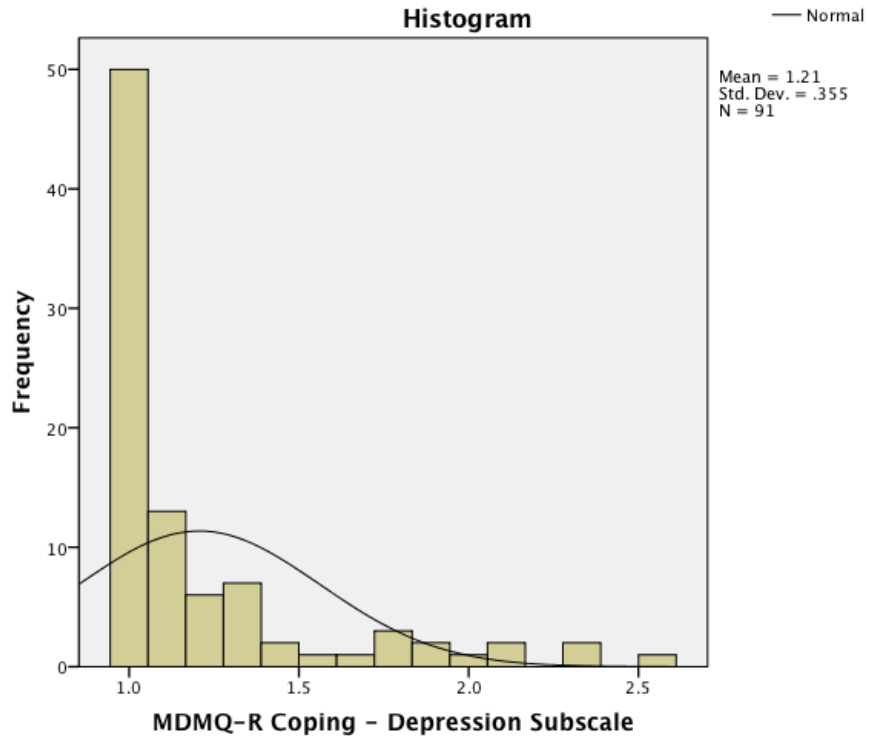

Figure I6. Distribution of Modified Drinking Motives Questionnaire – Revised: Coping – Depression Subscale Scores.

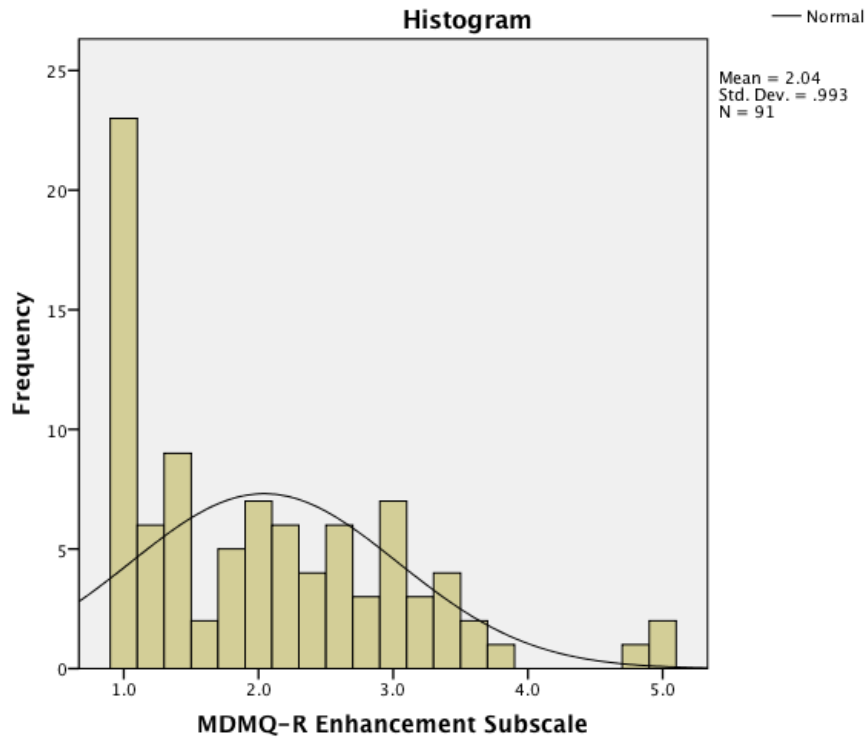

Figure I7. Distribution of Modified Drinking Motives Questionnaire – Revised: Enhancement Subscale Scores.

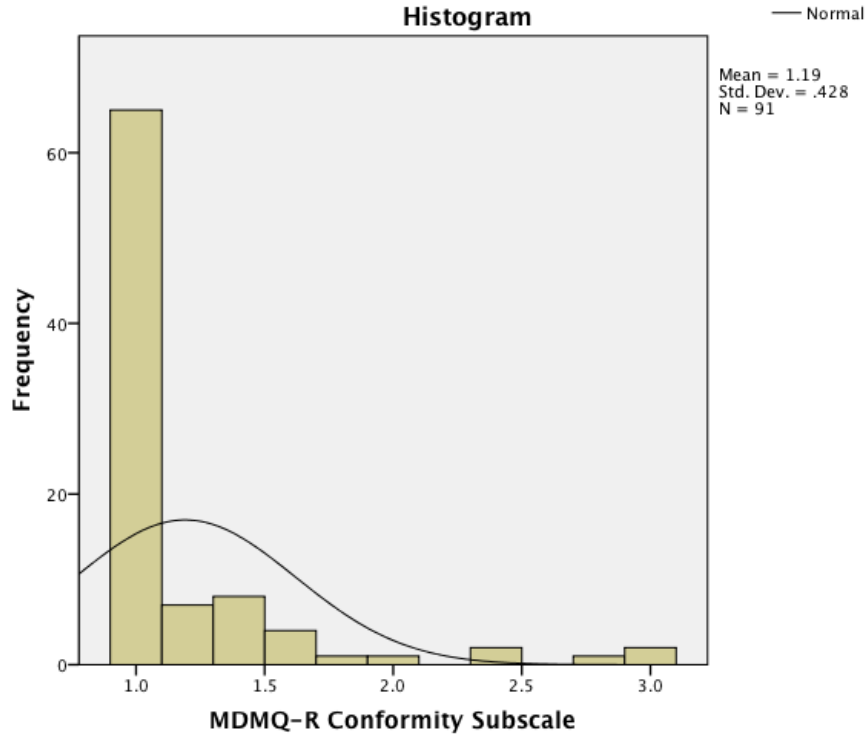

Figure I8. Distribution of Modified Drinking Motives Questionnaire – Revised: Conformity Subscale Scores.

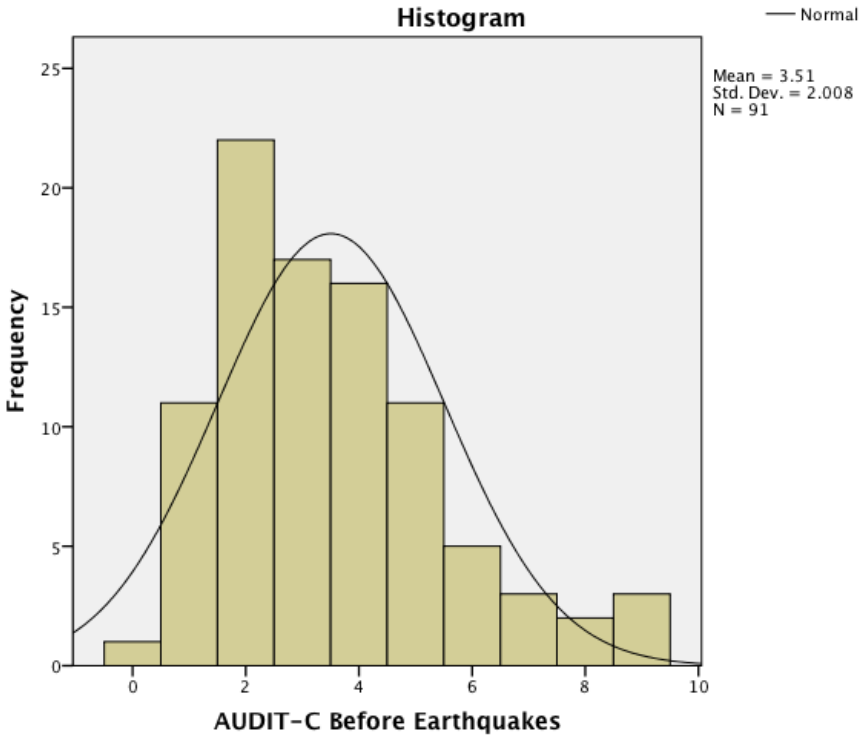

Figure I9. Distribution of Alcohol Use Disorders Identification Test – Consumption Scores at Time 1 (Before the Earthquakes).

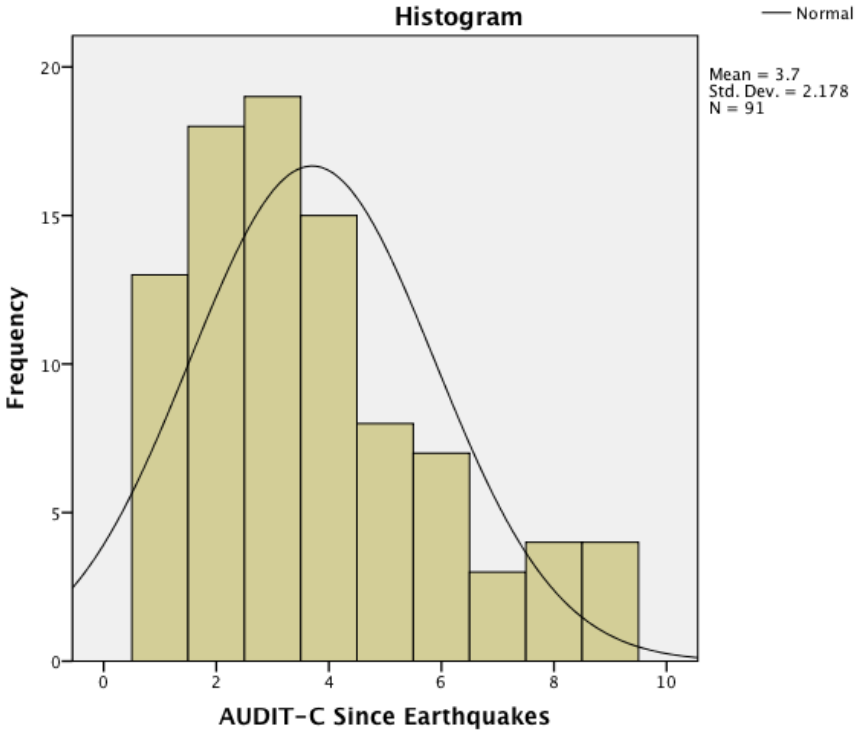

Figure I10. Distribution of Alcohol Use Disorders Identification Test – Consumption Scores at Time 2 (Since the Earthquakes).

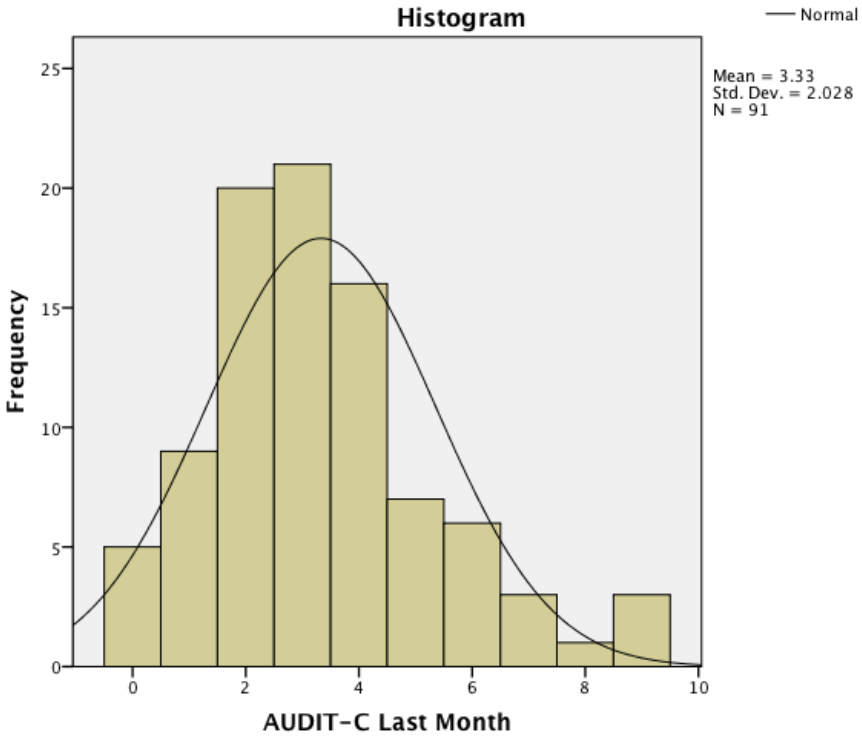

Figure 11. Distribution of Alcohol Use Disorders Identification Test – Consumption Scores at Time 3 (Last Month).